GPS AutoSteer System
Hardware Installation Manual

Supported Vehicles:

Cat Challenger
35
45
55

PN: 602-0214-01-A

LEGAL DISCLAIMER

Note: Read and follow ALL instructions in this manual carefully before installing or operating the AutoSteer system.

Note: Take careful note of the safety information in the Safety Information section and throughout this manual.

The manufacturer disclaims any liability for damage or injury that results from failure to follow the instructions and warnings set forth herein.

Please take special note of the following warnings:

1. There is NO obstacle avoidance system included in the manufacturer's product. Therefore, users must always have an operator on the equipment when the AutoSteer system is in use to look for any obstacles including people, animals, trees, ditches, buildings, etc.
2. During installation of the AutoSteer system and during the Calibration and Tuning processes the vehicle will pivot from side to side on its tracks. Be sure that all people and obstacles are clear of the vehicle before installation, calibration and tuning, or use of the AutoSteer system.
3. Use of the AutoSteer system is NOT permitted while the vehicle is on public roads or in public areas. Ensure that the system is OFF before driving on roads or in public areas.

Special Requirements

Tools

This list consists of the tools required to complete the installation. The installer is assumed to have a complete set of common installation tools.

Flat screwdriver	3/8" open wrench	15mm open wrench
#1 Phillips screwdriver	9/16" open wrench	17mm open wrench
#2 Phillips screwdriver	3/4" open wrench	21mm open wrench
Pliers	13/16" open wrench	17mm socket and ratchet
9/16" socket and ratchet	7/8" open wrench	21mm socket and ratchet
15/16" socket and ratchet	15/16" open wrench	Wire cutter small
Oil catch pan	Cleaning brush	Cleaning rags
Cable puller pole	Ten foot (3 meter) ladder	Tape measure (12ft minimum)
3/4" Torque wrench		

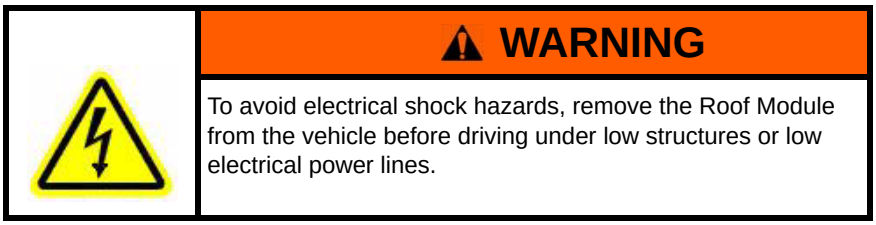
Safety Information

Warning Alerts

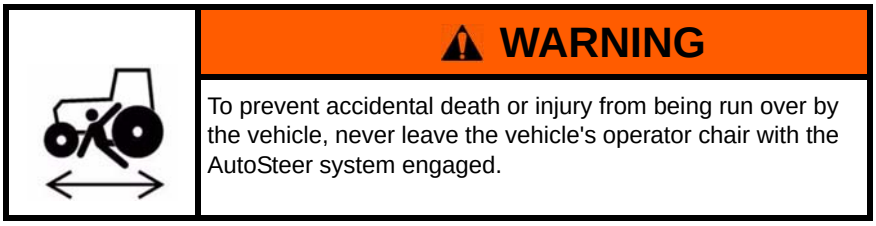
The AutoSteer system installer and manufacturer disclaim any responsibility for damage or physical harm caused by failure to adhere to the following safety requirements:

- As the operator of the vehicle, you are responsible for its safe operation.
- The steering system is *not* designed to replace the vehicle's operator.

Note: Verify that all screws, bolts, nuts, hose connections, and cable connections are tight after the final installation of the AutoSteer system on the vehicle.


⚠ WARNING
To avoid electrical shock hazards, remove the Roof Module from the vehicle before driving under low structures or low electrical power lines.

⚠ WARNING
Ensure that you are in a stable position on the vehicle platform when installing or removing the Roof Rail and Roof Module so you do not fall.


⚠ WARNING
To prevent accidental death or injury from being run over by the vehicle, never leave the vehicle's operator chair with the AutoSteer system engaged.

⚠ WARNING

High-Pressure Fluid Hazard

Read the Owner's Manual before installation. Wear hand and eye protection while performing hydraulic system maintenance. Relieve hydraulic system pressure before servicing the hydraulic system.

⚠ WARNING

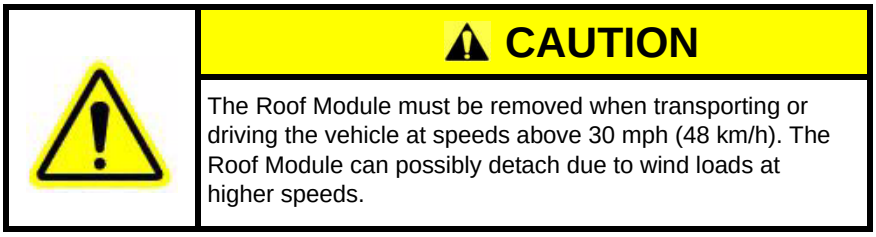
To understand the potential hazards associated with the operation of AutoSteer equipment, read the provided documentation before installing the GPS steering system on a vehicle.

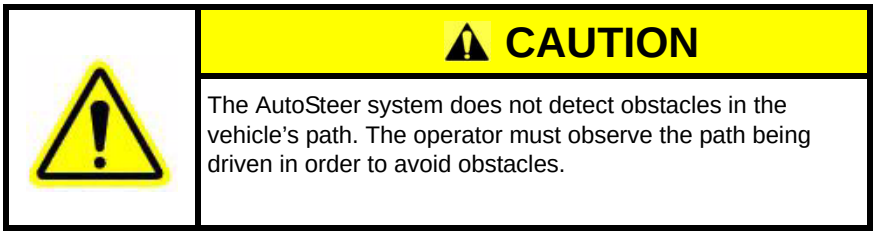
⚠ WARNING

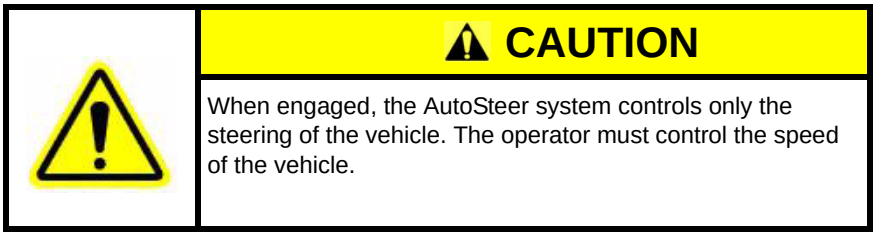
To prevent the accidental engagement of AutoSteer and loss of vehicle control while driving on roads, shut down the AutoSteer system (exit the program). Never drive on roads or in public areas with the AutoSteer system turned on.

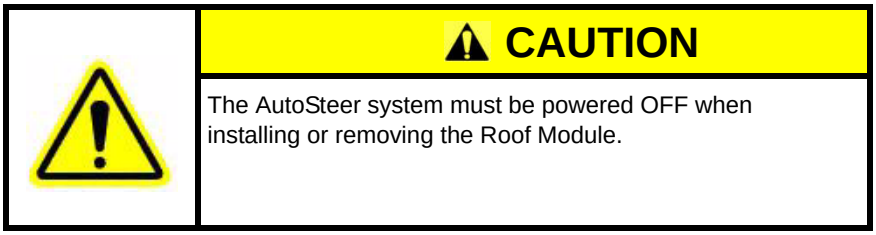
Caution Alerts

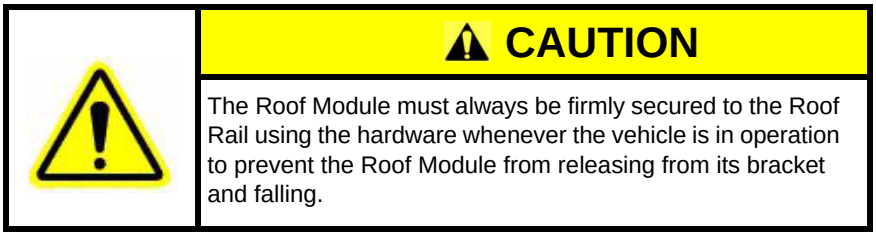
The AutoSteer system installer and manufacturer disclaim any responsibility for damage or physical harm caused by failure to adhere to the following safety requirements:


CAUTION
The Roof Module must be removed when transporting or driving the vehicle at speeds above 30 mph (48 km/h). The Roof Module can possibly detach due to wind loads at higher speeds.


CAUTION
The AutoSteer system does not detect obstacles in the vehicle's path. The operator must observe the path being driven in order to avoid obstacles.


CAUTION
When engaged, the AutoSteer system controls only the steering of the vehicle. The operator must control the speed of the vehicle.




CAUTION
The Roof Module must always be firmly secured to the Roof Rail using the hardware whenever the vehicle is in operation to prevent the Roof Module from releasing from its bracket and falling.

Vehicle Requirements

The vehicle steering and hydraulic systems must be in good working order before installing the AutoSteer system. Check for loose or worn parts. Drive the vehicle and confirm that it steers straight and the vehicle turns proportionally to the left and right. Check the steering system hydraulic hoses and connections to ensure there are no oil leaks.

The vehicle electrical system and battery must be in good working order.

The vehicle should be fully cleaned before installing the AutoSteer system. A clean vehicle will improve the overall installation and cable routing and will also reduce the chance for oil contamination when the hydraulic connections are opened.

Important Information

This installation manual contains valuable information for servicing the AutoSteer system. After the installation is complete, store this manual in a safe place for future reference.

Note: Verify that all screws, bolts, nuts, hose connections, and cable connections are tight after the final installation of the AutoSteer system on the vehicle.

Technical Support

Refer to your owner's manual for technical support information.

Contact Information

Refer to your owner's manual for contact information.

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Installation Overview

The **Installation Overview** chapter information is provided in the following sections:

- *Installation Kit Overview*
  - *Sub-Assemblies*
    - *Steering Valve Kit Components*
    - *Hose Kit Components*
    - *Bracket Kit Components*
- *Pre-Installation Vehicle Tests*
- *Installation Procedure Outline*
- *Cable Diagram*

This installation guide describes the installation of the AutoSteer system on several models of Caterpillar track vehicles. The AutoSteer installation kit PN: 188-0023-01 is used on the following models:

- Caterpillar Track 35, 45, and 55 models

The vehicle specific sub-assemblies for the vehicle series are listed in Table 1-1.

Note: If you are installing an electric steering wheel actuator such as OnTrac II, skip the Steering Valve, SA Module, and SA Module Harness installation information in this book and refer to your electric steering product manual for further instructions.

Installation Kit Overview

This Installation Kit Overview section is divided into sub-sections for each of the three sub-assemblies as shown in Figure 1-1. The components in each sub assembly are described in the following sections.

Figure 1-1 Installation Kit Components (PN: 188-0023-01)

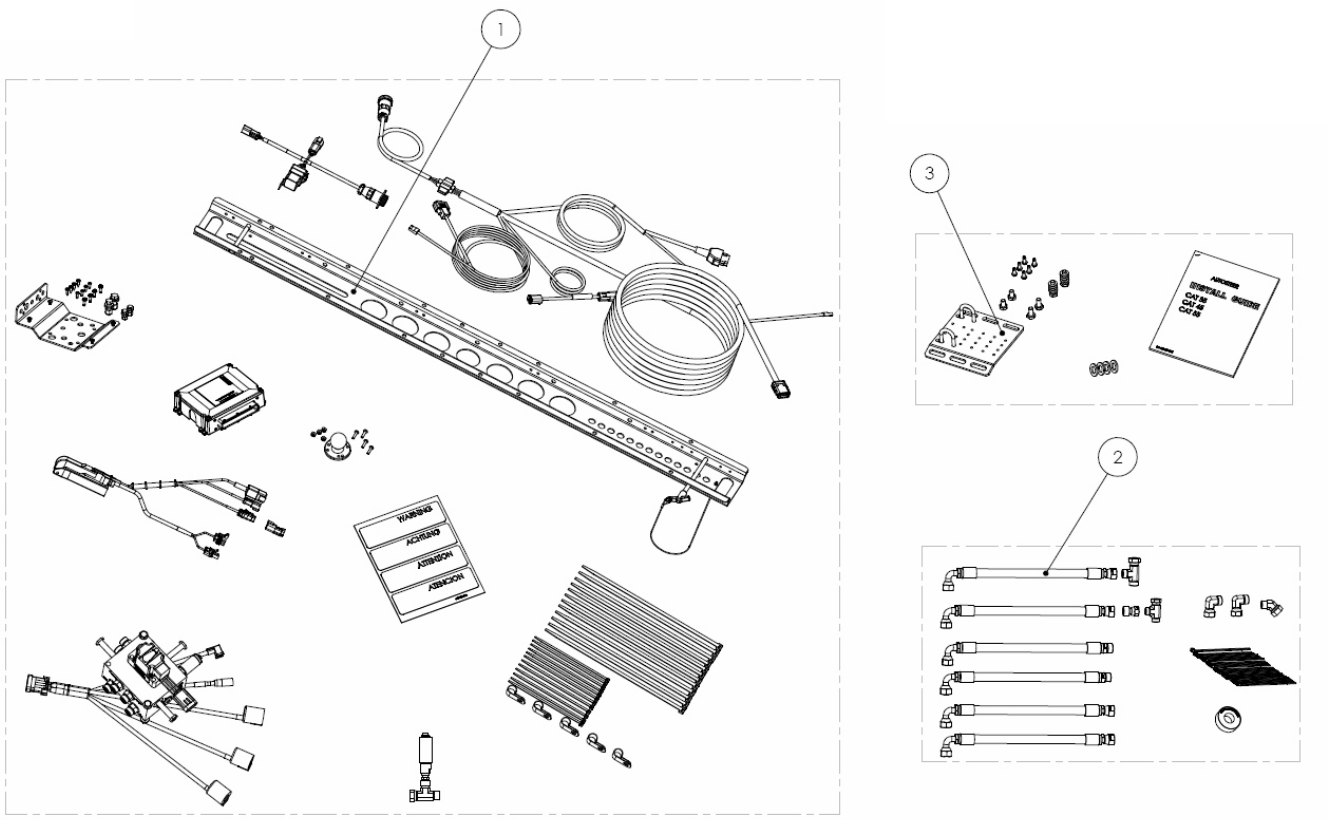


Table 1-1 Installation Kit Components (PN: 188-0023-01)

Item	Component	Part Number
1.	Steering Valve Kit - Cat	153-0007-01
2.	Hose Kit - Cat 35/45/55 (06/2004)	500-0022-02
3.	Brackets Kit Cat 35/45/55	152-0021-01

Sub-Assemblies

This vehicle installation kit contains the following components:

- Steering Valve Kit Components
- Hose Kit Components
- Bracket Kit Components

Steering Valve Kit Components

Figure 1-2 Steering Valve Kit Components (PN: 153-0007-01)

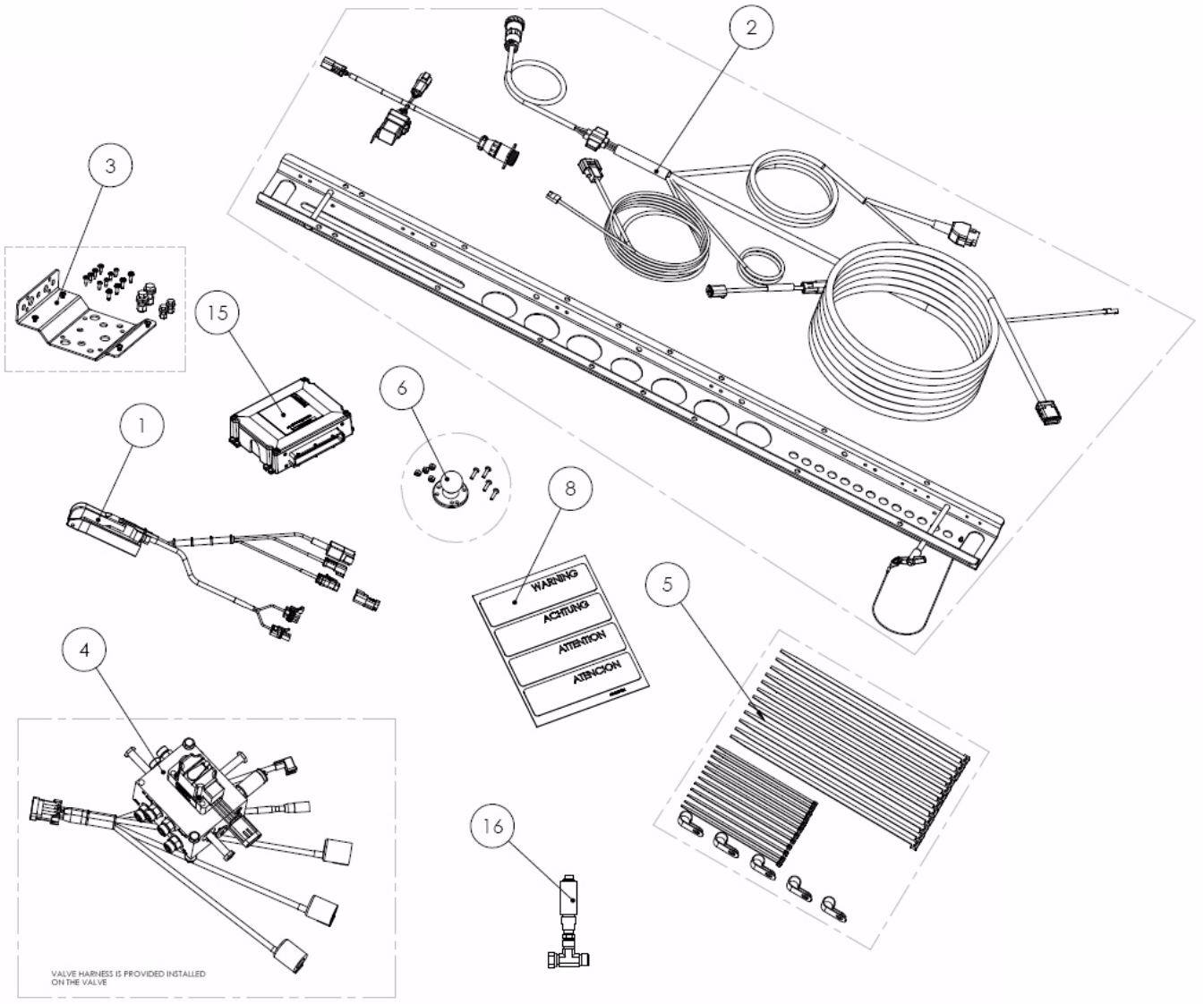


Table 1-2 Steering Valve Kit Components (PN: 153-0007-01)

Item	Component	Part Number
1.	SA Module Harness - Cat	201-0162-02
2.	Assembly Kit - Common	200-0497-02
3.	SA Module Bracket Assembly	200-0190-01
4.	Valve Assembly - Cat	500-0010-02
5.	Cable Routing Hardware - Cat 35/45/55	200-0121-01

Item	Component	Part Number
6.	Kit - RAM Mount Base with Screws	200-0508-01
8.	Attention Switch Off Label	603-0074-01
15.	SA Module Assembly - Wheeled	200-0206-01
16.	Temperature Sensor Kit - Cat	200-0119-01

Hose Kit Components

Figure 1-3 Hose Kit Components (PN: 500-0022-02)

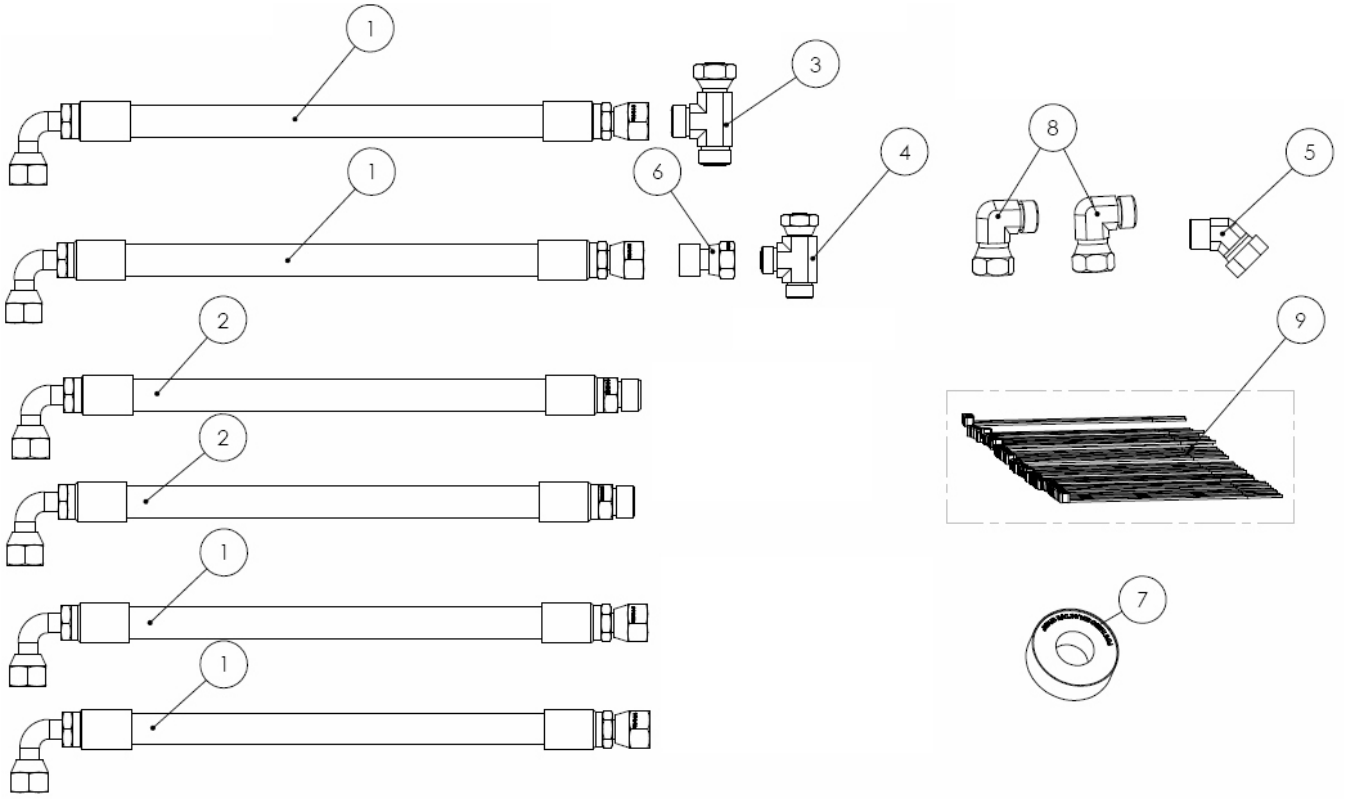


Table 1-3 Hose Kit Components (PN: 188-0012-01)

Item	Component	Part Number
1.	Hose - 1/2” x 78” -8F 90 Degree x -8F ORFS	502-0006-02
2.	Hose - 1/2” x 78” -8F 90 Degree x -8M ORFS	502-0007-02
3.	Adapter, Run Tee ORFS F-M-M -8	506-0004-01
4.	Adapter, Run Tee ORFS F-M-M -6	506-0003-01
5.	Adapter, 45 Degree Elbow ORFS -8	506-0027-01

Item	Component	Part Number
6.	Adapter, Expander -8M x -6F ORFS	506-0061-01
7.	Tape Teflon 1/2” x 520”	511-0001-01
8.	Adapter, 90 Degree Elbow ORFS -8	506-0013-01
9.	Kit - Cable Tie Hose ID	200-0467-01

Bracket Kit Components

Figure 1-4 Bracket Kit Components (PN: 152-0021-01)

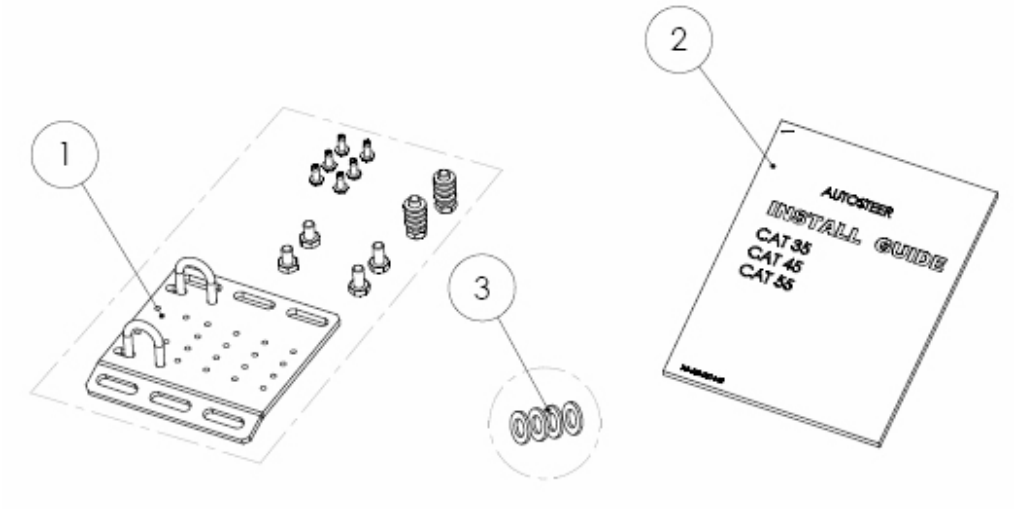


Table 1-4 Hose Kit Components (PN: 188-0012-01)

Item	Component	Part Number
1.	Display Bracket Assembly	200-0469-02
2.	Installation Guide	602-0214-01
3.	Washer, Flat M16x30x3	517-0007-01

Pre-Installation Vehicle Tests

The vehicle’s steering system must be in good working condition prior to the installation of the AutoSteer System. Verify the existing steering system is operating correctly by performing the tests listed below in a wide open area.

Note: The steering system test requires a relatively large area. Ensure you have enough room to perform the test before beginning.

---

1. Drive the vehicle in a low gear and slowly turn the steering wheel all the way to the left. The vehicle should steer to the left at a steadily increasing rate until it is making a sharp left turn.
2. Drive the vehicle in a low gear and slowly turn the steering wheel all the way to the right. The vehicle should steer to the right at a steadily increasing rate until it is making a sharp right turn.
3. On flat terrain, drive the vehicle in a straight line in a low gear and release the steering wheel. The vehicle and steering wheel should spring back to the center position and continue to drive straight after releasing the wheel without drifting right or left.

   Note: The vehicle and steering wheel should return to the center position and continue to drive straight after releasing the wheel without drifting right or left.

4. Ask the vehicle driver or owner if they have experienced any vehicle steering problems. The operator should report no steering problems.

If the vehicle passes the four tests, proceed with the AutoSteer system installation. If the vehicle fails one or more of the tests, the steering system must be evaluated by a Caterpillar dealer and repaired if necessary.

Possible causes of steering problems:

- Incorrect track tension
- Hydraulic problem

Note: The Steering Valve controls the steering of the vehicle by changing the oil flow in the steer lines. The amount of oil used to control the vehicle's turn is very small. On some higher hour vehicles, it is possible that the vehicle may have excessive internal leakage in the steering system that will not allow the Steering Valve to build up enough flow to control

the steering. Though the AutoSteer system will not work, it is possible that manual steering work adequately in this situation. If after installing the AutoSteer system the system does not steer and all troubleshooting procedures have been followed, it may be necessary to have the system pressure and flow checked by an Caterpillar dealer service technician.

Installation Procedure Outline

1. Verify that all components have been received.

Note: Steps 2, 3, 4, and 8 are skipped if installing an electric steering actuator such as OnTrac II.

2. Install the Hydraulic Valve Assembly.

3. Install the Hydraulic Hoses.

4. Install the SA Module.

5. Install the Roof Rail on the cab roof.

6. Install the Roof Module on the Roof Rail.

7. Install the Monitor Mounting bracket in the cab

8. Install the SA Module harness.

9. Install the Main Cable harness.

10. Install the display using a RAM mount arm.

11. Connect the Main Cable harness to the display harness (Power, DB9 serial, RJ-45)

Note: Instructions for connecting the vehicle kit cables to the display can be found in the display owner's manual.

12. Verify that all connectors are properly coupled and secured.

13. Start the vehicle and check for oil leaks.

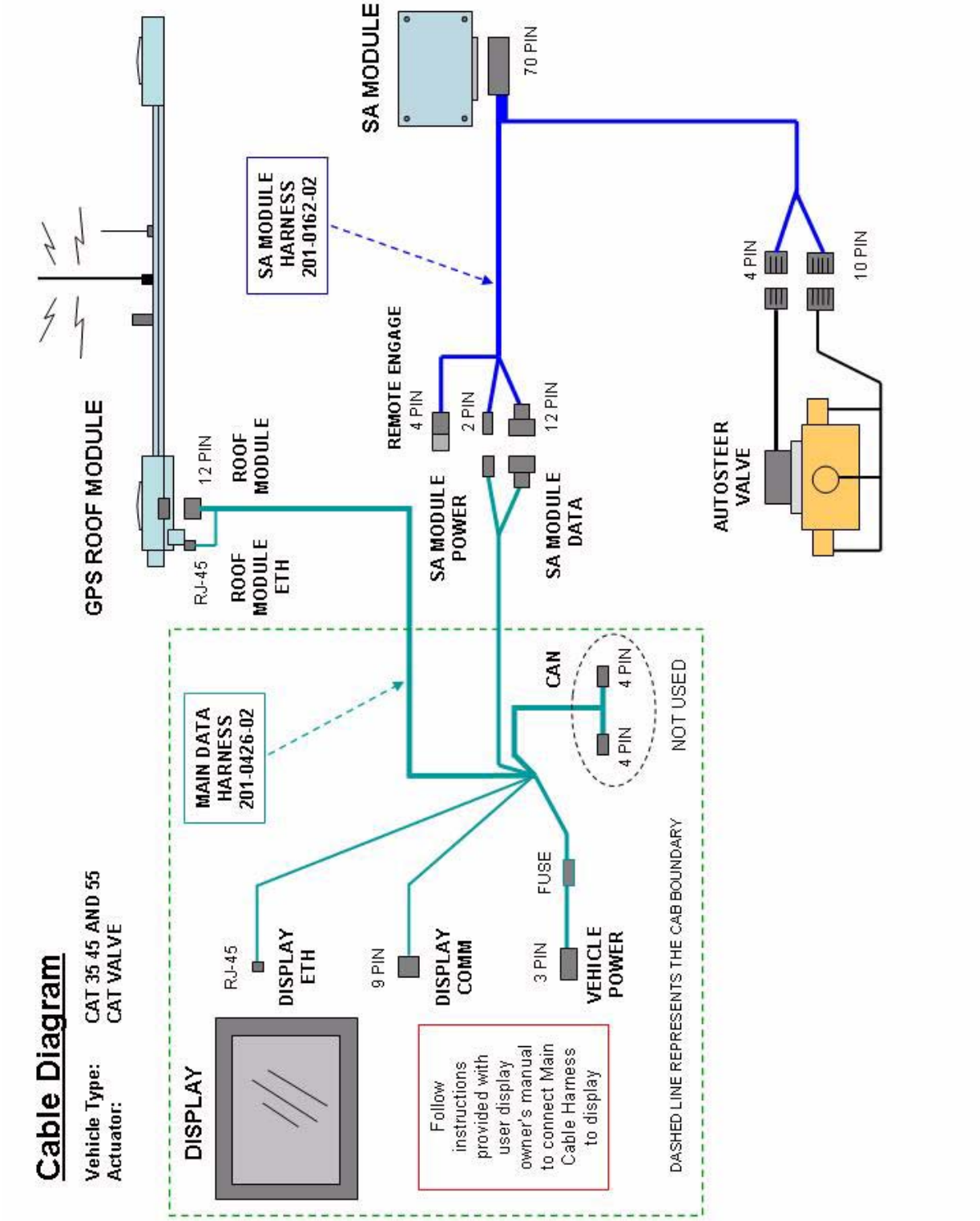
14. Power ON the AutoSteer system.

15. Calibrate the vehicle.

16. Tune the vehicle.

17. Verify that the AutoSteer system has been installed properly and operates satisfactorily.

Cable Diagram



Steering Valve Installation

The **Steering Valve Installation** chapter information is provided in the following sections:

- *Steering Valve Installation Procedure Overview*
- *Prepare the Steering Valve for Installation*
- *Install the Steering Valve*
- *Hydraulic Hose Overviews*
  - *Steering Valve Port Overview*
  - *Hose Connection Overview*
- *Hydraulic Hose Connection Procedure*
  - *Attach Hoses to the Steering Valve*
  - *Attach Hoses to the Vehicle Connections*
- *Hydraulic Installation Checklist*

Note: Only technicians trained for hydraulic valve installations should perform the installation procedures in this chapter. If your vehicle requires a hydraulic Steering Valve to be installed ensure a trained technician is available for the installation.

Steering Valve Installation Procedure Overview

1. Prepare the Steering Valve for installation on the vehicle.
2. Install the Steering Valve on the vehicle.
3. Connect the six hoses between the Steering Valve and the vehicle.
4. Check for oil leaks.
5. Perform a manual functional test to confirm correct valve operation.

⚠ WARNING

High-Pressure Fluid Hazard

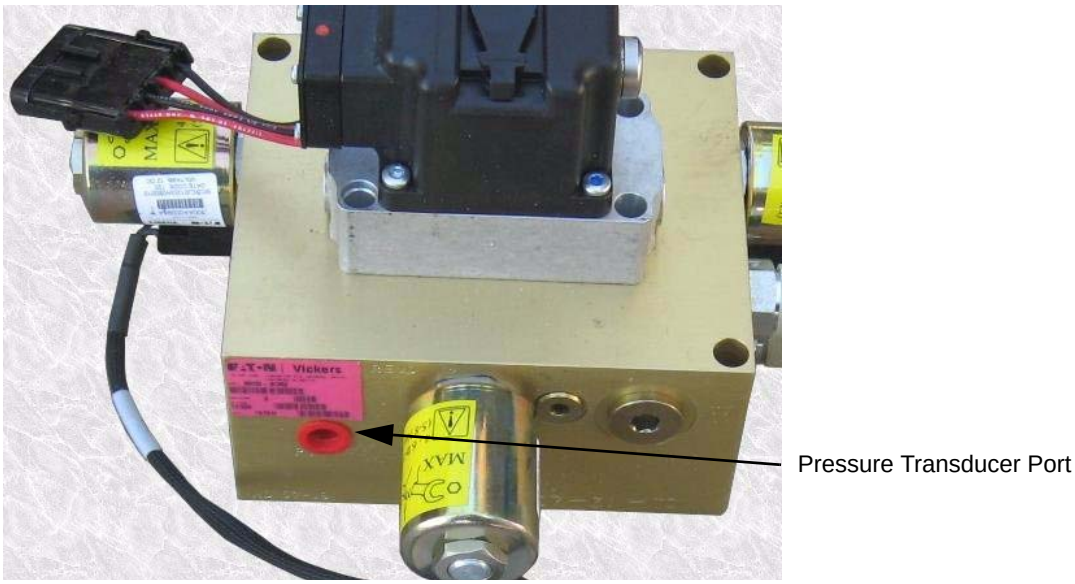
Read the Owner's Manual before installation. Wear hand and eye protection while performing hydraulic system maintenance. Relieve hydraulic system pressure before servicing the hydraulic system.

Prepare the Steering Valve for Installation

Prior to installing the Steering Valve onto the vehicle, an elbow and pressure transducer must be attached to the valve. Follow the procedure below to prepare the valve for installation.

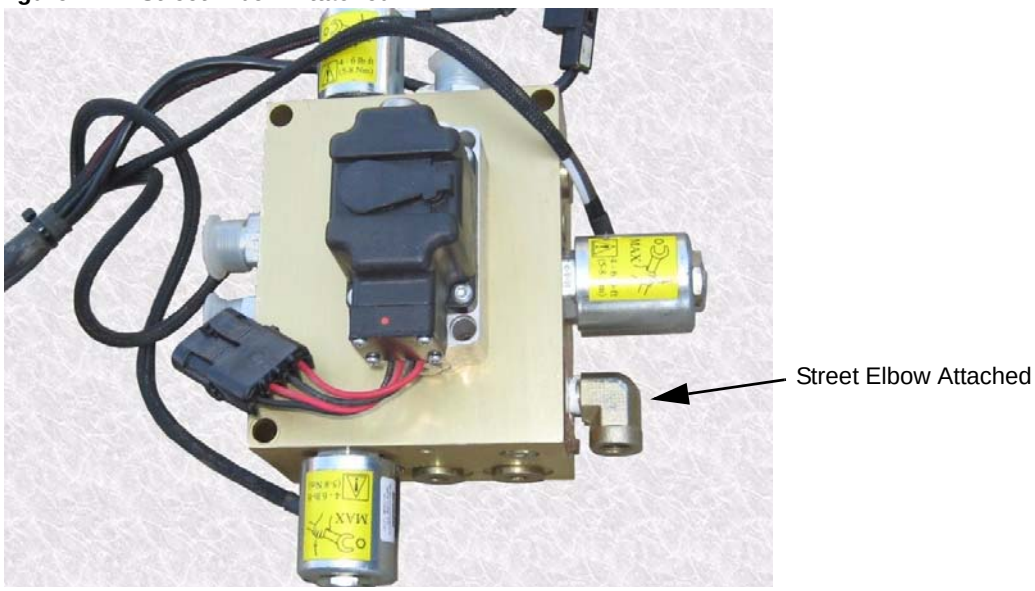
1. Place the Steering Valve on a flat surface, identify the pressure transducer port, and remove the protective port plug with a pliers or flat screwdriver. See *Figure 2-1*.

Figure 2-1 Identify the Pressure Transducer Port



2. Wrap Teflon tape two times around the threaded side of the street elbow provided with the kit.
3. Attach the street elbow to the pressure transducer port and tighten with a 3/4" wrench. Point the elbow away from the valve body as shown in *Figure 2-2*.

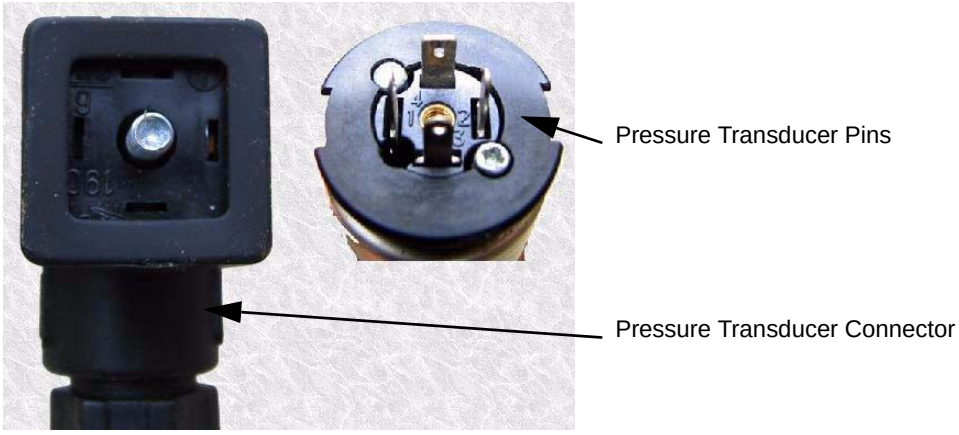
Figure 2-2 Street Elbow Attached



4. Wrap Teflon tape around the threads of the pressure transducer two times.
5. Attach the pressure transducer to the street elbow and tighten with a 3/4" wrench.
6. Tighten the pressure transducer until the pins match the connector so the wire will stay near the Steering Valve as shown in *Figure 2-3* and *Figure 2-5*.

Note: Verify the pins match up correctly. Do not force the connection.

Figure 2-3 Pressure Transducer Connectors



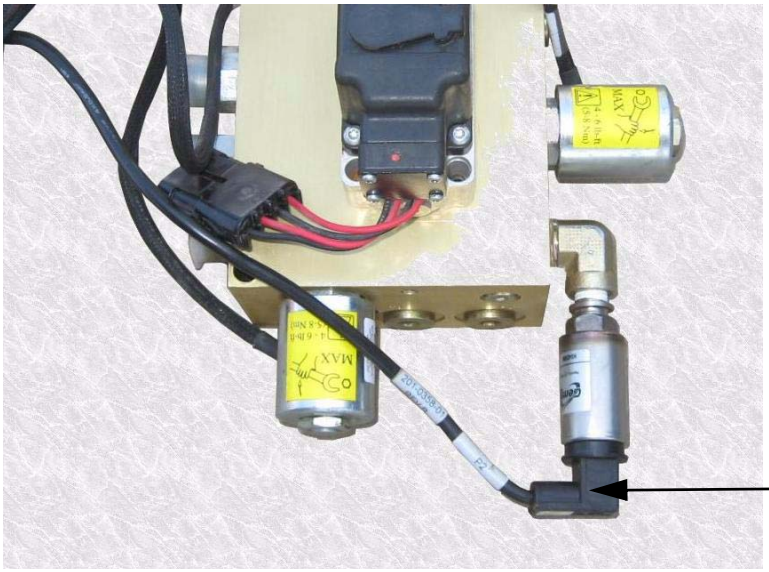
7. Attach the rubber gasket over the pressure transducer connector, then attach the pressure transducer connector to the pressure transducer, and then secure the connection with the screw. Tighten the screw with a #1 Phillips screwdriver. See *Figure 2-4*

Figure 2-4 Pressure Transducer Connector Detail

Note: The pressure transducer kit may come with an alternative rubber gasket. Either one can be used, but ensure that one is installed. Failure to use the rubber gasket will allow moisture to get into the sensor and cause it to fail.

8. The Steering Valve is ready to install and should look similar to *Figure 2-5*.

Figure 2-5 Pressure Transducer Attached



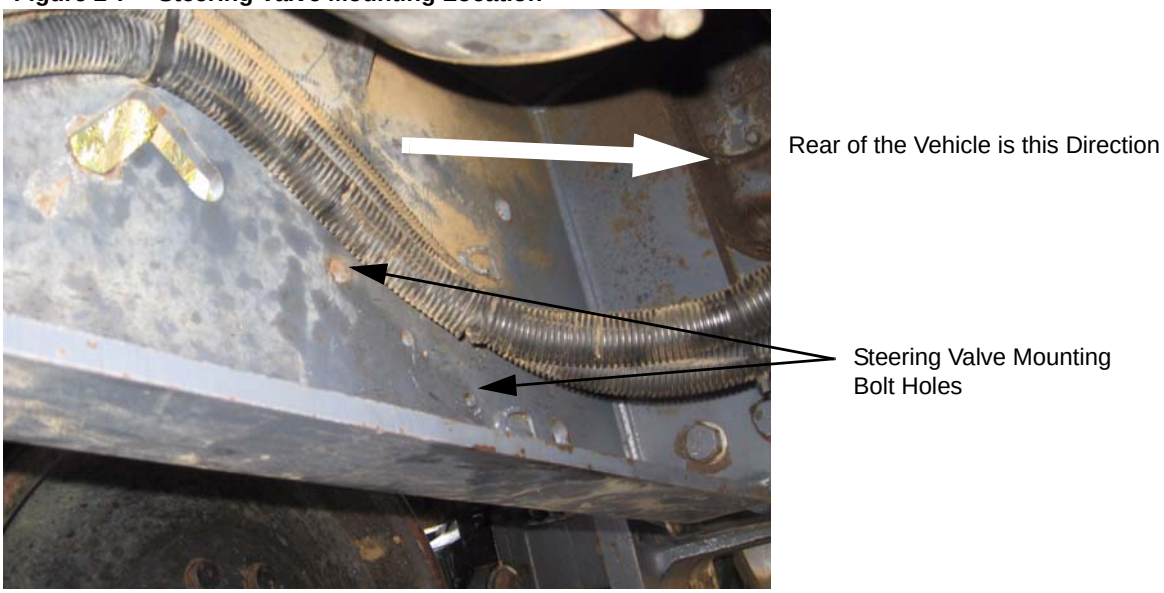
Install the Steering Valve

The Steering Valve is installed on the inside of the vehicle's frame ahead of the cab on the right side of the vehicle. *Figure 2-6* shows the mounting location from the outside. The valve is attached directly to the frame.

Figure 2-6 Caterpillar 35, 45, and 55 Steering Valve Mounting Location

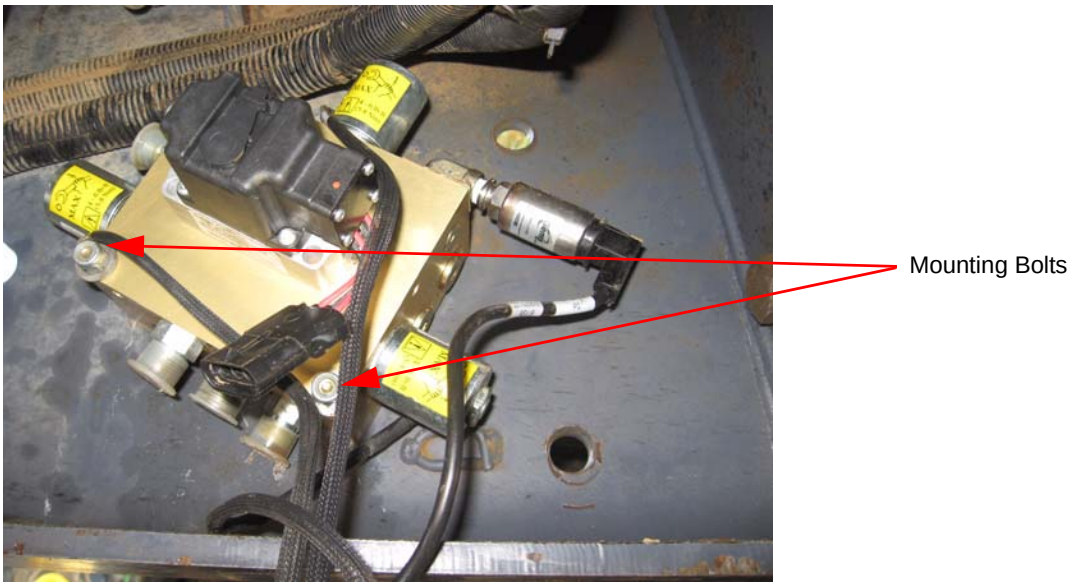
1. Locate the two existing bolt holes from the inside of the of the right side frame under the engine area as shown in *Figure 2-7*.

Figure 2-7 Steering Valve Mounting Location



2. Attach the Steering Valve with the two 3/8"x 4" bolts, washers, and nuts provided with the installation kit shown in *Figure 2-8*. Tighten the bolts with a 9/16" wrench and 9/16" socket and ratchet.

Figure 2-8 Steering Valve Mounted



3. The Steering Valve is now mounted.

Hydraulic Hose Overviews

Steering Valve Port Overview

The Steering Valve has six ports that need to be connected to the vehicle's hydraulic system. The ports on the left side of the valve are shown in *Figure 2-9* and the ports on the bottom of the valve are shown in *Figure 2-10*.

Figure 2-9 Left Side Ports on Steering Valve

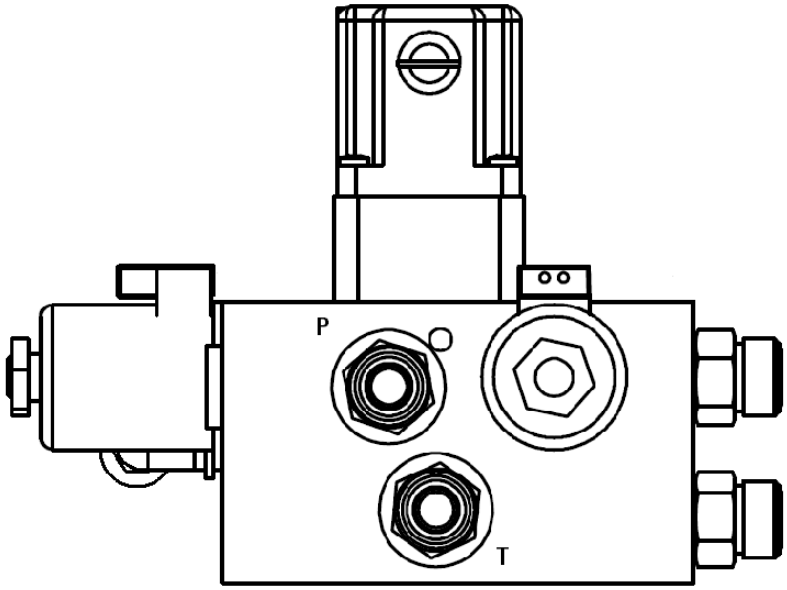


Figure 2-10 Bottom Ports on Steering Valve

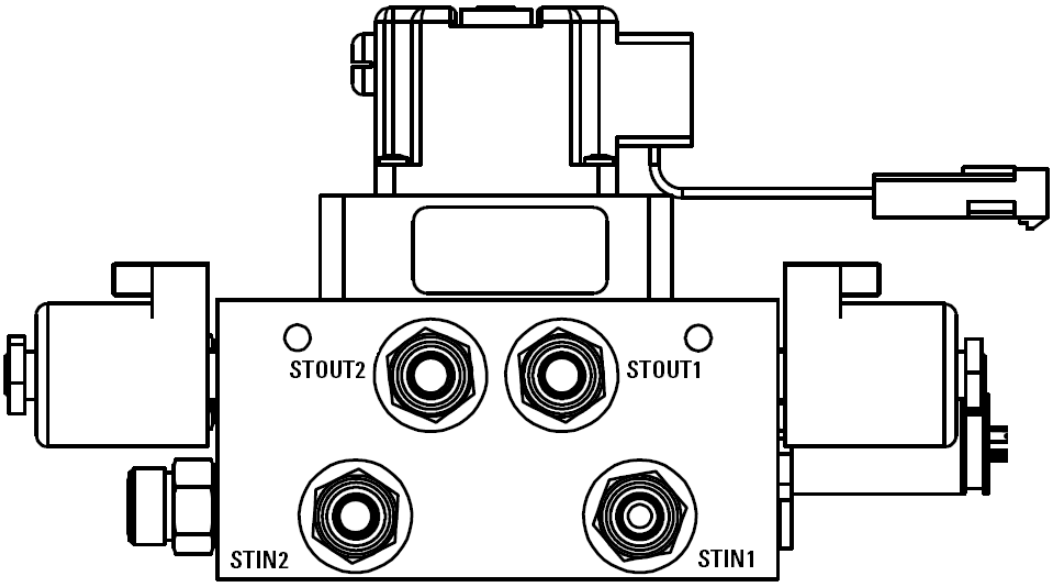


Table 2-1 shows a description and the fitting types and sizes of each of the ports on the Steering Valve.

Table 2-1 Steering Valve Port Functions and Fitting Sizes

Valve Label	Function	Fitting Type/Size
P	Pressure Line	-8 ORFS
T	Tank Line	-8 ORFS
STIN1	Steer Right from Orbitrol	-8 ORFS
STOUT1	Steer Right out to Vehicle	-8 ORFS
STIN2	Steer Left from Orbitrol	-8 ORFS
STOUT2	Steer Right out to Vehicle	-8 ORFS

Hose Connection Overview

Figure 2-11 shows an overview on how the hose connections are to be attached. The P port is teed into the main steering pressure line. The T port is teed into the main steering tank line. The existing steer lines are disconnected from the vehicle ports and the steer right line from the orbitrol is connected to the STIN1 port and the steer left line from the orbitrol is connected to the STIN2 port. The STOUT1 port is then connected to the steer right port on the vehicle and the STOUT2 port is connected to the steer left port on the vehicle.

Table 2-2 shows the list of hoses provided by the installation kit. The kit also provides colored cable ties. To ensure the correct hose is attached to the correct port on both sides, attach the colored cable tie shown in the table to each end of the hose listed prior to beginning the installation. It is also recommended that the existing hoses and ports on the vehicle are also labeled with the colored cable tie that the new hoses will be attaching to before disconnecting the hoses to prevent a mix up.

The numbers in *Figure 2-11* and Table 2-2 correspond to the Item Numbers for each hose provided in Table 1-2. If the number has a “- #” after it, it means that there are multiple hoses with the same length and fittings.

Figure 2-11 Caterpillar 35, 45, and 55 Hose Connections

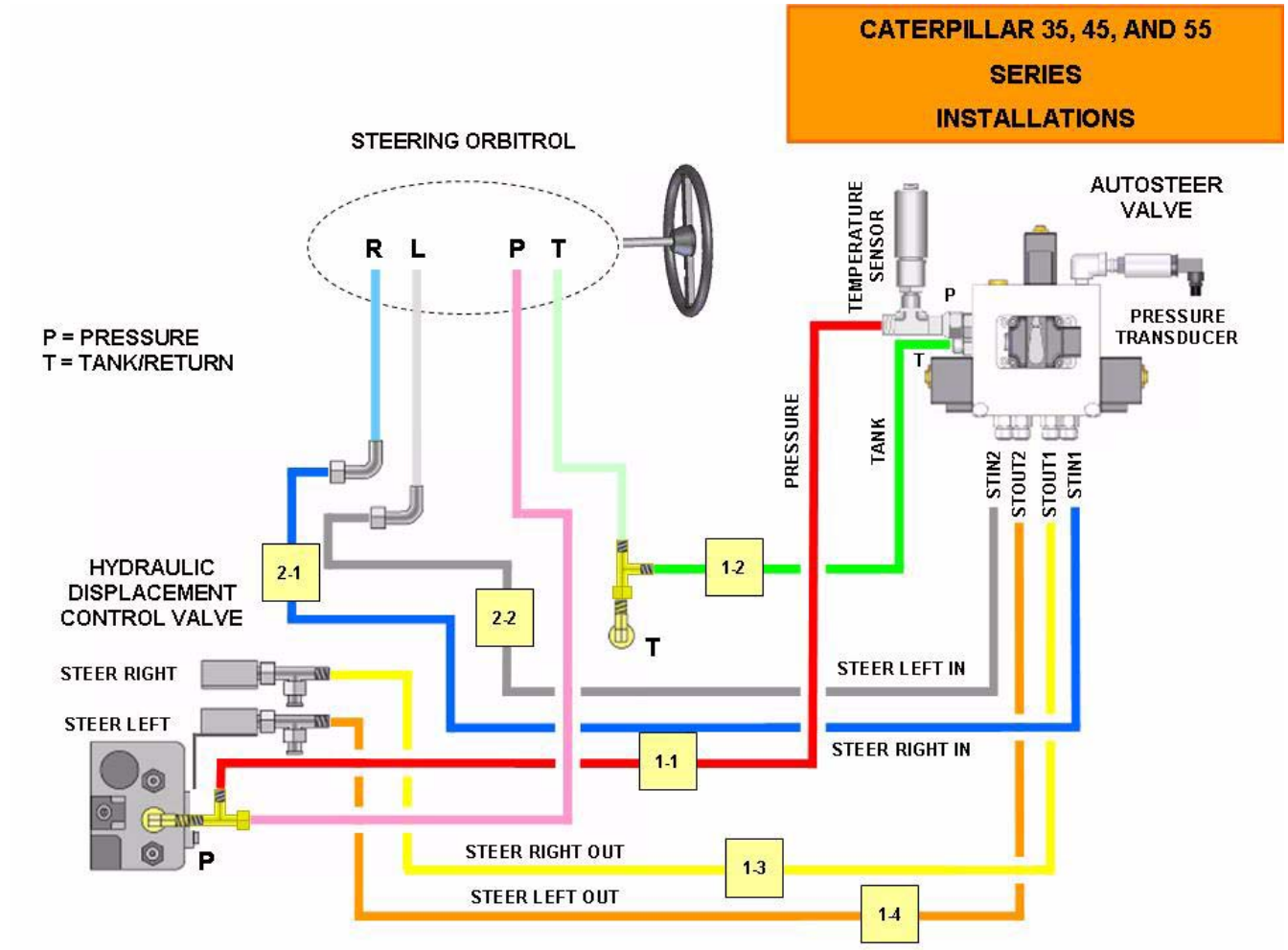


Table 2-2 Color Codes for Hydraulic Hoses

Valve Port Hose	Color	Item Number	Notes
P	Red	1-1	1/2" x 78" Hose -8 90 Deg ORFS x -8F ORFS
T	Green	1-2	1/2" x 78" Hose -8 90 Deg ORFS x -8F ORFS
STIN1	Blue	2-1	1/2" x 78" Hose -8 90 Deg ORFS x -8F ORFS
STIN2	Grey	2-2	1/2" x 78" Hose -8 90 Deg ORFS x -8F ORFS
STOUT1	Yellow	1-3	1/2" x 78" Hose -8 90 Deg ORFS x -8F ORFS
STOUT2	Orange	1-4	1/2" x 78" Hose -8 90 Deg ORFS x -8F ORFS

Hydraulic Hose Connection Procedure

Note: Due to the limited space in the Steering Valve port area, the hoses should be connected in the order provided by this installation manual to reduce installation problems. Refer to the hose diagram in *Figure 2-11* and Table 2-1 and Table 2-2 for information on connecting the correct hydraulic hose to the correct ports on the vehicle and Steering Valve.

⚠ WARNING

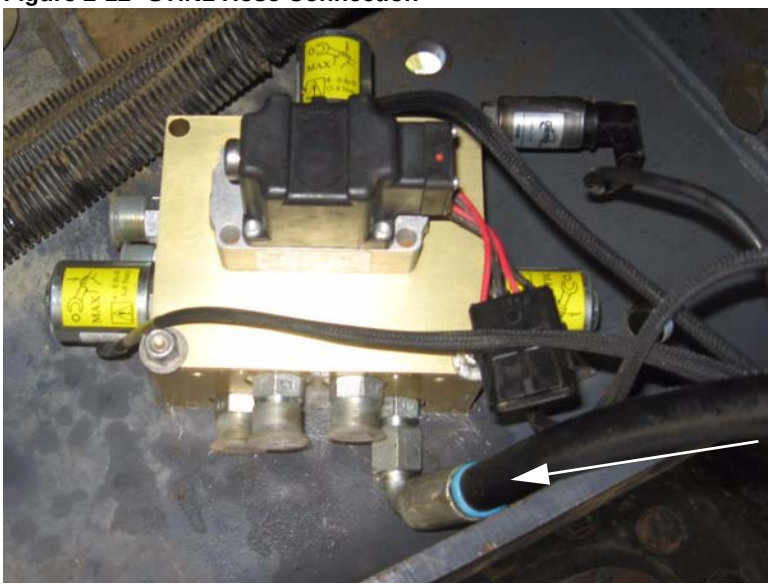
High-Pressure Fluid Hazard

Read the Owner's Manual before installation. Wear hand and eye protection while performing hydraulic system maintenance. Relieve hydraulic system pressure before servicing the hydraulic system.

Attach Hoses to the Steering Valve

1. Prepare the hydraulic hoses in the kit by attaching the proper colored cable ties to the ends of the hoses as described in Table 2-2.
2. Attach the 90 degree connector of the Steer In Right hose to the STIN1 port on the Steering Valve.
3. Position the hose as shown in *Figure 2-12* and tighten the connection with a 15/16" wrench.

Figure 2-12 STIN1 Hose Connection



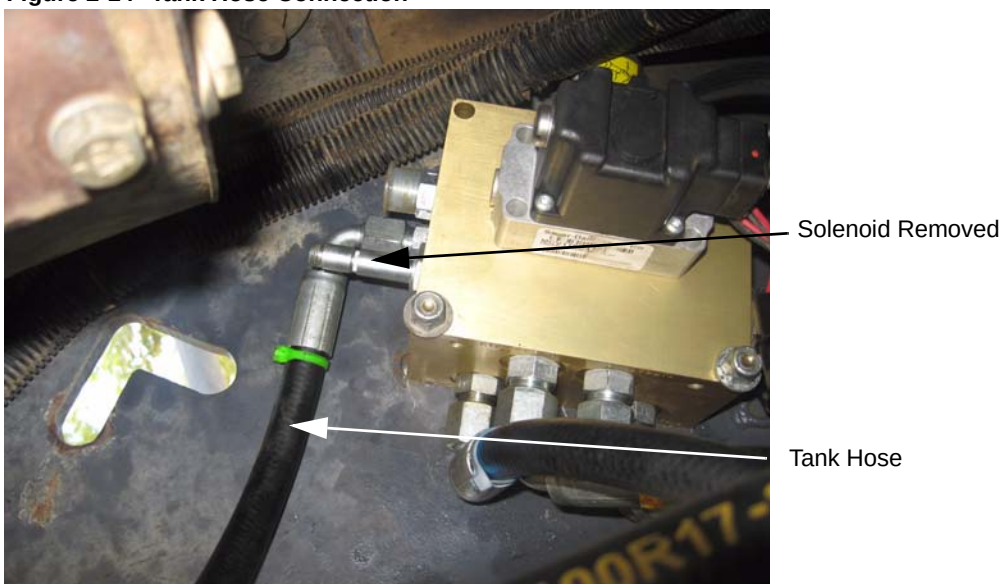
4. Attach the 90 degree connector of the Steer In Left hose to the STIN2 port on the Steering Valve. Leave the connection loose for the time being.
5. Attach the 90 degree connector of the Steer Out Right hose to the STOUT1 port on the Steering Valve. Leave the connection loose for the time being.
6. Attach the 90 degree connector of the Steer Out Left hose to the STOUT2 port on the Steering Valve. Leave the connection loose for the time being.
7. Adjust the angles of the 90 degree hose connections as shown in *Figure 2-13* and then tighten the three connectors with a 15/16" wrench.

Figure 2-13 STIN2, STOUT1, STOUT2 Hose Connection

8. To simplify the installation of the Tank hose, remove the solenoid from the left side of the valve with a 3/4" wrench.

9. Attach the 90 degree connector of the Tank hose to the T port on the Steering Valve. Point the hose connection downward and tighten the connection with a 15/16" wrench as shown in *Figure 2-14*.

Figure 2-14 Tank Hose Connection



10. Reattach the solenoid valve and tighten only to 4-6 ft. lbs (5-8 nm) with a torque wrench. Verify that it is attached the correct way (wires point towards the valve).

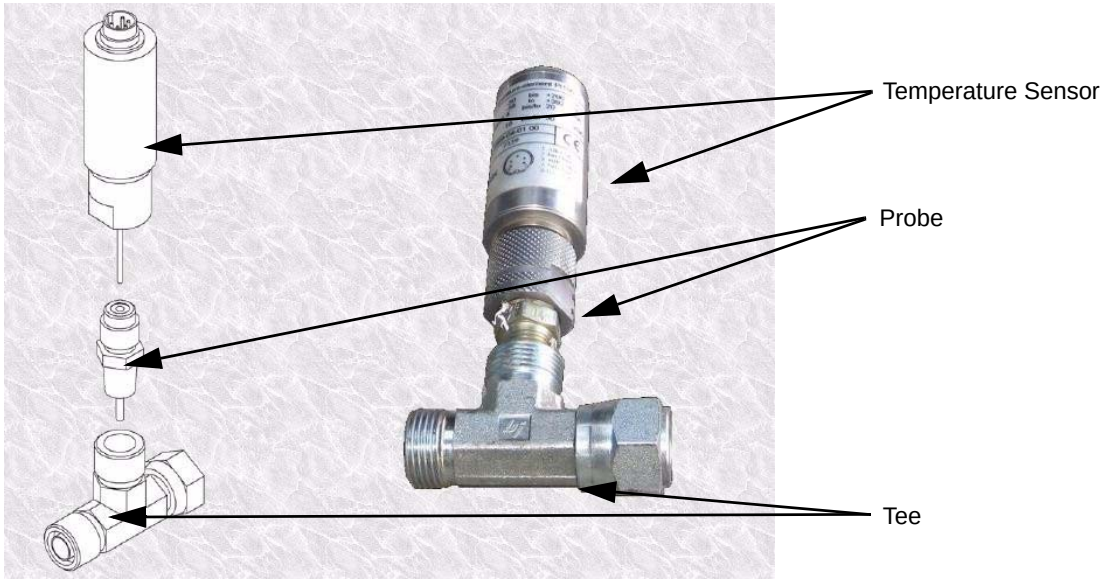
Note: Do not over tighten the nut or the solenoid could be damaged.

---

11. Assemble the temperature sensor assembly by attaching the temperature sensor to the probe. Tighten the connection with 17mm and 21mm wrenches. No Teflon is required for this connection as there is no oil pressure here.

12. Attach the probe to the tee. Before attaching, the probe to the tee, wrap the threads two times with Teflon tape. Tighten the connections with 3/4" and 17mm wrenches. See *Figure 2-15* for the final assembly.

Figure 2-15 Temperature Sensor Assembly



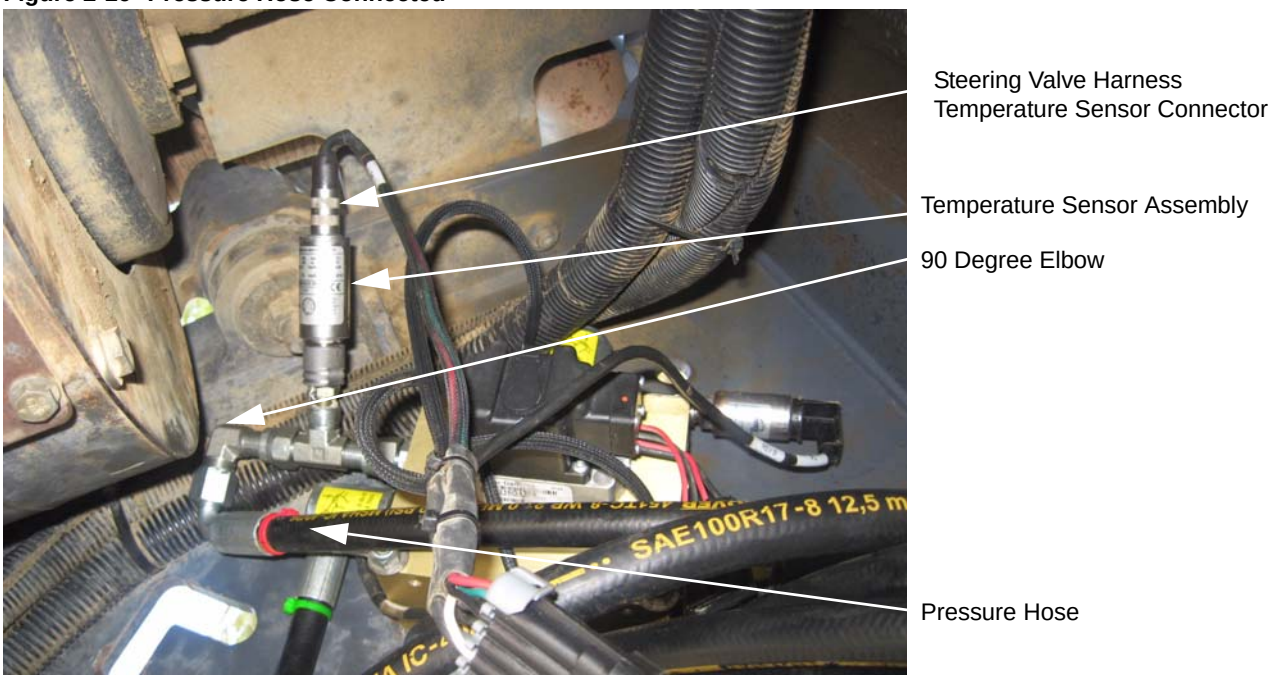
13. Attach the temperature sensor assembly to the P port on the Steering Valve. The temperature sensor should point upwards.

14. Connect the temperature sensor connector of the Steering Valve harness to the temperature sensor.

15. Attach a 90 -8 ORFS degree elbow to the end of the temperature sensor assembly tee and point the elbow downward.

16. Attach the 90 degree connector of the Pressure hose to the elbow. Tighten all connections with a 15/16" wrench. See *Figure 2-16* for an example of the final assembly.

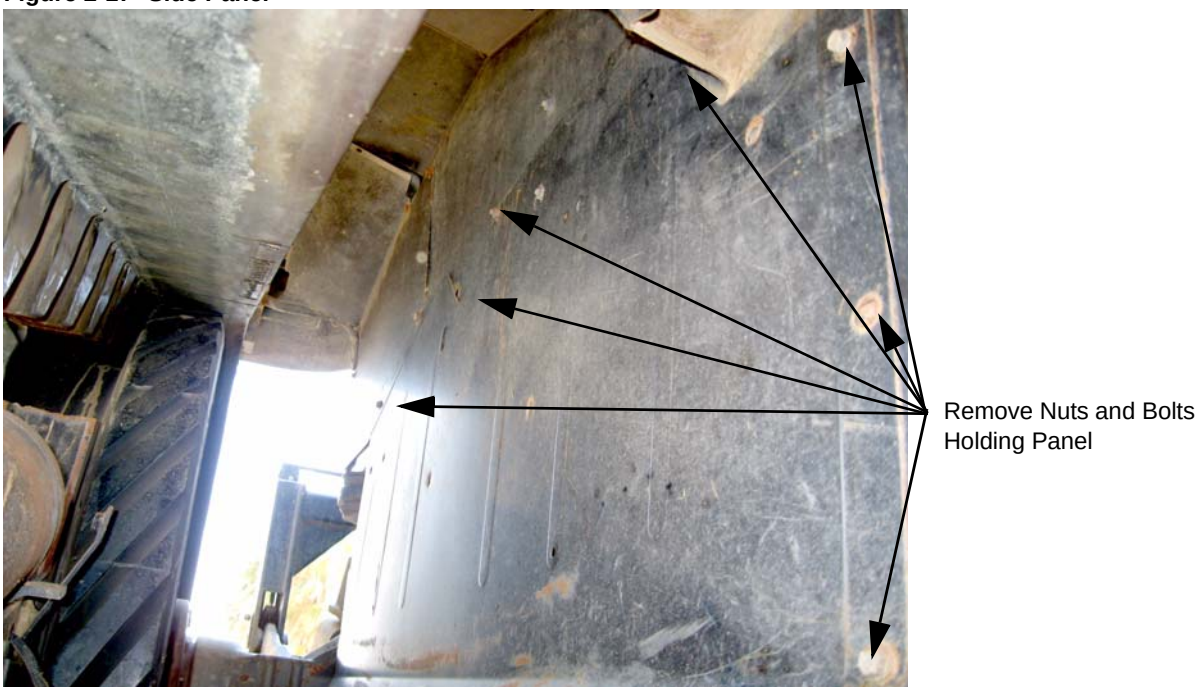
Figure 2-16 Pressure Hose Connected



Attach Hoses to the Vehicle Connections

1. Locate the nuts and bolts holding the side panel to the right side of the vehicle between the tracks and the cab. See *Figure 2-17*. Remove the nuts and bolts with a 1/2" socket and ratchet.

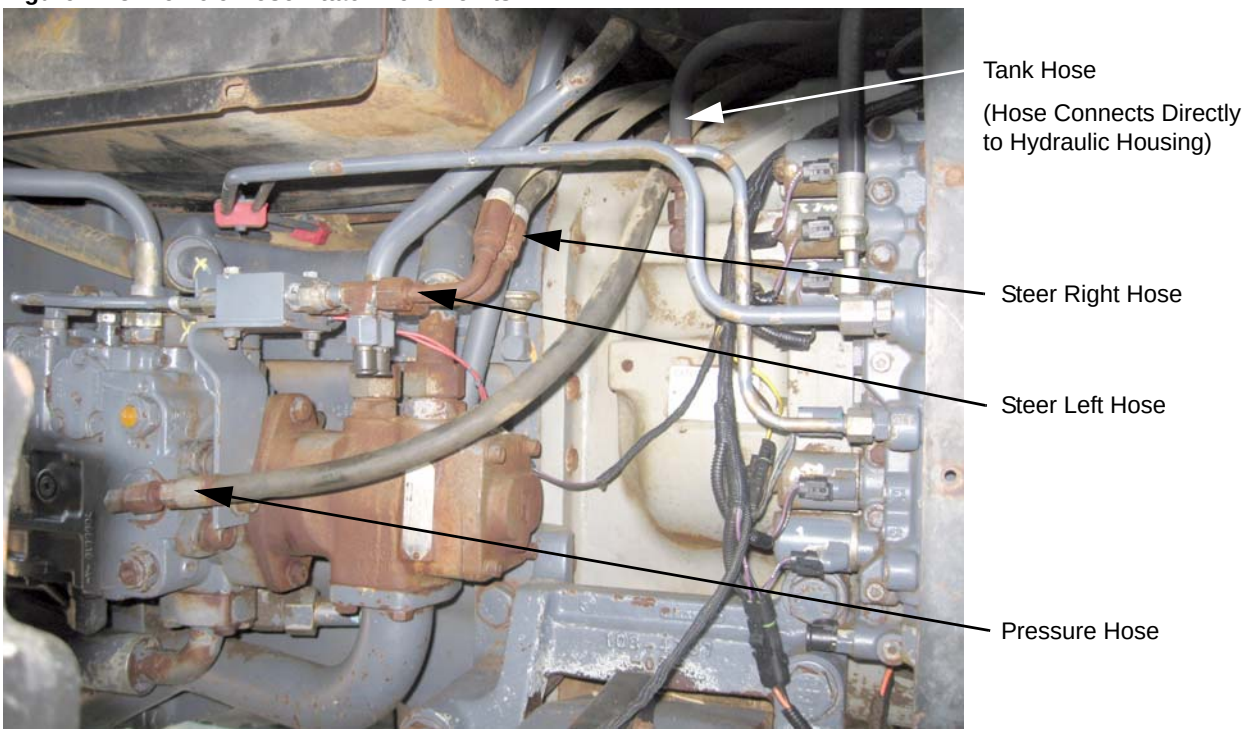
Figure 2-17 Side Panel



Note: Remove the nuts last as the studs will hold the panel from falling. When the nuts are removed be careful to not allow the panel to fall.

2. Identify the ports and hoses that the Steering Valve will be connected to. See *Figure 2-18*.

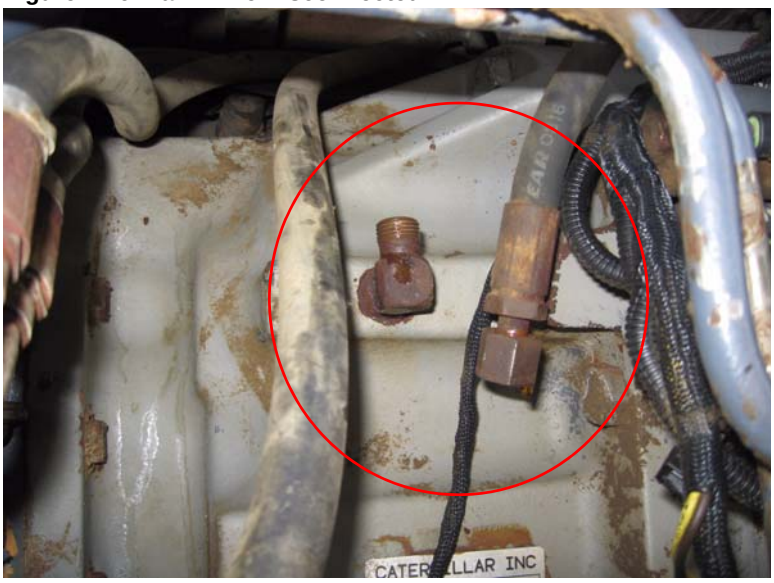
Figure 2-18 Vehicle Hose Attachment Points



3. Mark the existing steer left and steer right hoses with the colored cable ties provided with the kit to prevent them from being mixed up. The hose ends should be labeled the same color as the Steer In Left and Steer In Right hoses are. The existing ports would be labeled the same color as the Steer Out Left and Steer Out Right hoses are colored.

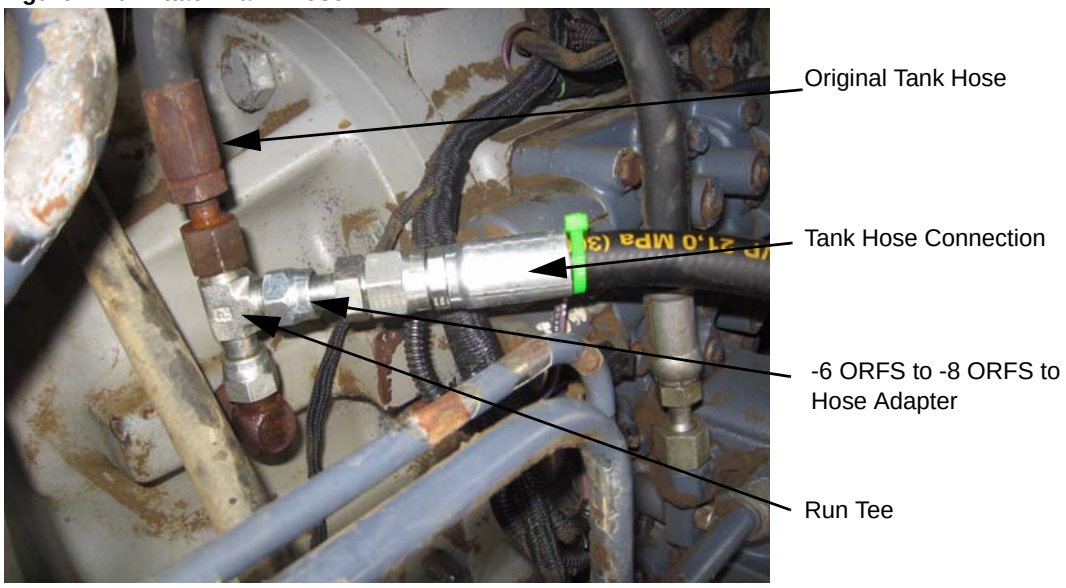
4. Disconnect the exiting Tank line with 13/16" and 3/4" wrenches. See *Figure 2-19*.

Figure 2-19 Tank Line Disconnected



5. Attach a -6 ORFS run tee to the existing fitting.
6. Attach the original hose to the end of the run tee.
7. Attach a -8 ORF to -6 ORFS hose adapter to the end of the Tank hose from the Steering Valve.
8. Attach the Tank hose to the tee port. See *Figure 2-20*

Figure 2-20 Attach Tank Hose

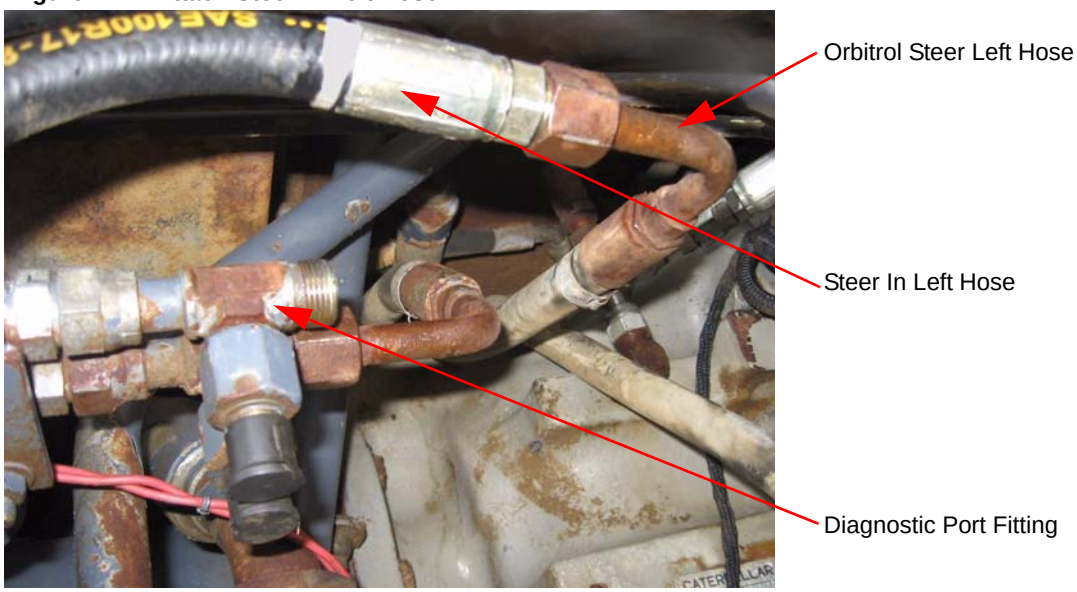


9. Tighten all hose connections and adapters with 13/16", 7/8", and 15/16" wrenches.

10. Disconnect the Orbitrol Steer Left hose from the diagnostic port fitting with 3/4" and 15/16" wrenches.

11. Attach the Steer In Left hose from the Steering Valve to the Orbitrol Steer Left hose. Tighten fittings with 7/8" and 15/16" wrenches. See *Figure 2-21*.

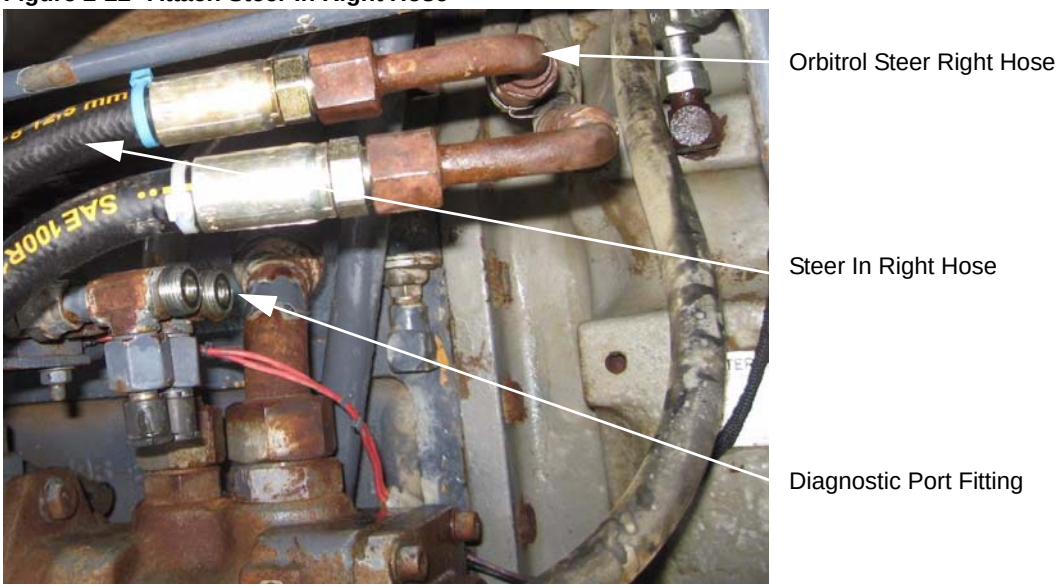
Figure 2-21 Attach Steer In Left Hose



12. Disconnect the Orbitrol Steer Right hose from the pressure test port with 3/4" and 15/16" wrenches.

13. Attach the Steer In Right hose from the Steering Valve to the Orbitrol Steer Right hose. Tighten fittings with 7/8" and 15/16" wrenches. See *Figure 2-22*.

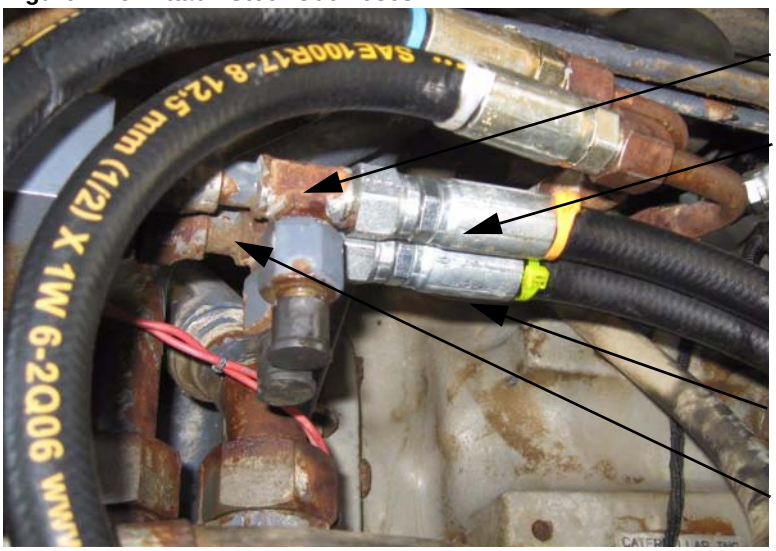
Figure 2-22 Attach Steer In Right Hose



14. Attach the Steer Out Right hose to the steer right diagnostic port adapter. Tighten the hose with 3/4" and 15/16" wrenches.

15. Attach the Steer Out Left hose to the steer left diagnostic port adapter. Tighten the hose with 3/4" and 15/16" wrenches. See *Figure 2-23*.

Figure 2-23 Attach Steer Out Hoses



16. Disconnect the existing Pressure line from the fitting at the pump with 3/4", 7/8", and 15/16" wrenches.

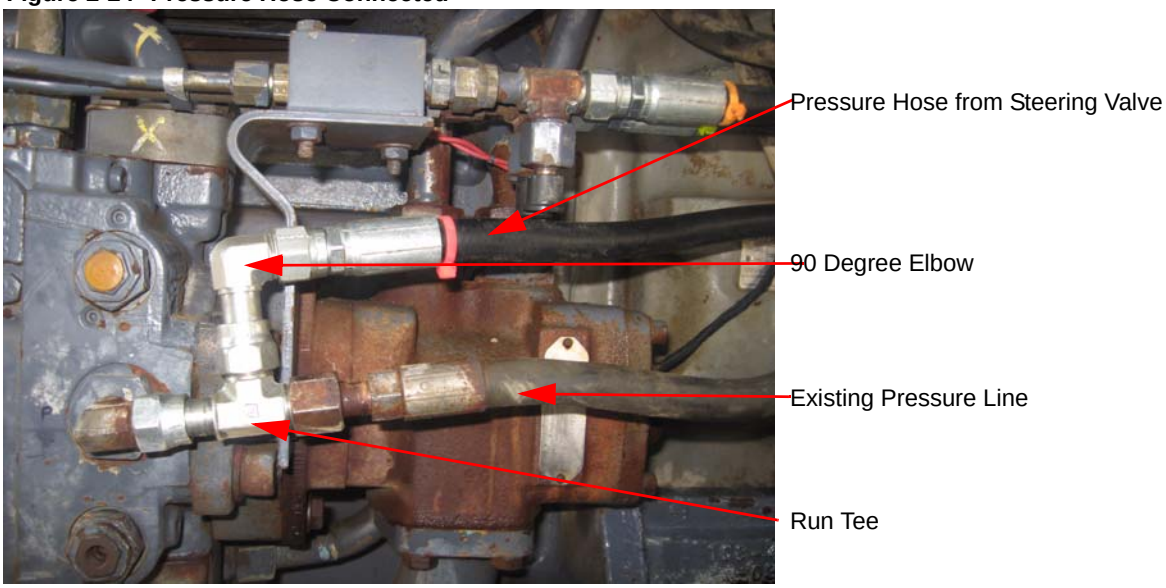
17. Attach a -8 ORFS run tee to the fitting.

18. Connect the existing pressure line to the end of the tee.

19. Attach a 90 degree -8 ORFS elbow to the tee port and point towards the front of the machine.

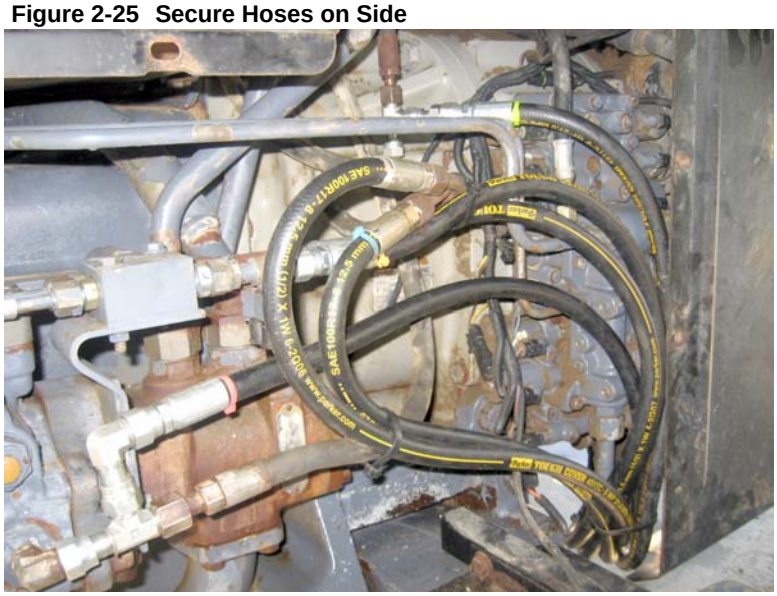
20. Attach the Pressure hose from the Steering Valve to the elbow and tighten all connections with a 15/16" wrench. See *Figure 2-24*.

Figure 2-24 Pressure Hose Connected



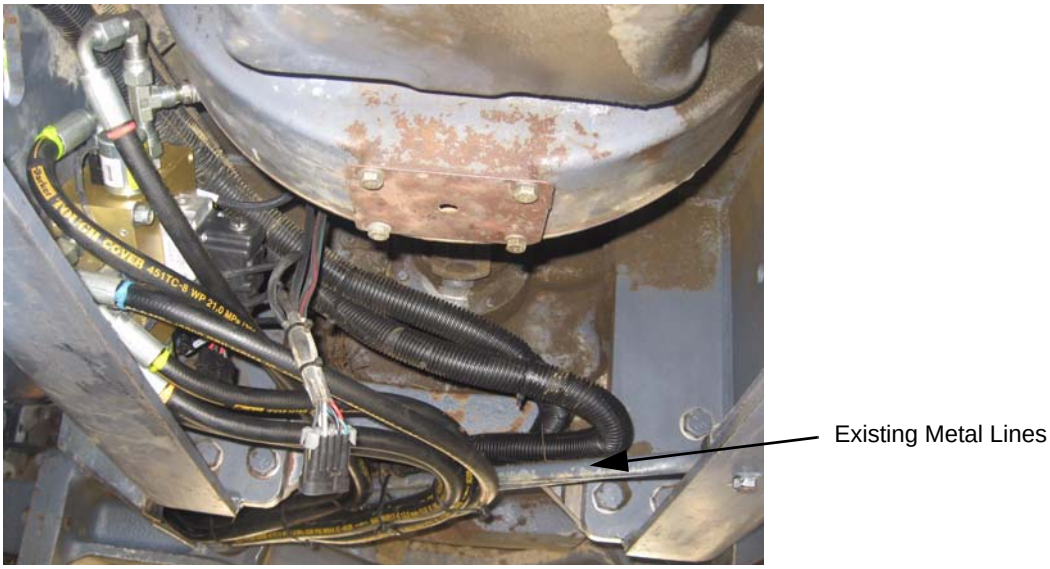
21. Organize and secure the hoses using cable ties in the side compartment so they cannot be damaged. See *Figure 2-25*.

Figure 2-25 Secure Hoses on Side



22. Organize and secure the hoses under the vehicle going to the Steering Valve using heavy duty cable ties. Attach the hoses to the existing metal lines. See *Figure 2-26*.

Figure 2-26 Secure Hoses to Bottom of Vehicle



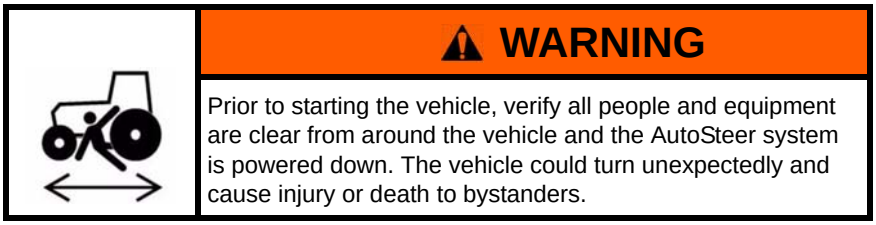
Hydraulic Installation Checklist

Before starting the vehicle after installing the valve and hoses, verify the following to prevent damage to the vehicle or oil spills.

1. The mounting bolts that secure the valve to the frame are tight.
2. The P hose is connected to correct port on Steering Valve and vehicle pressure port.
3. The T hose is connected to correct port on Steering Valve and vehicle tank port.

Note: If the Pressure and Tank hoses are reversed, the vehicle could possibly turn unexpectedly when the AutoSteer is engaged. Double check these connections to make sure they are correct.

4. The STIN1 steer hose is connected to the correct port on the Steering Valve and attached to the steer right line from the orbitrol.
5. The STIN2 steer hose is connected to the correct port on the Steering Valve and attached to the steer left line from the orbitrol.
6. The STOUT1 steer hose is connected to correct port on the Steering Valve and the steer right port on the vehicle.
7. The STOUT2 steer hose is connected to correct port on the Steering Valve and the steer left port on the vehicle.
8. The Pressure Transducer has been installed and tightened.
9. The Temperature Sensor has been installed and tightened.
10. All other hose fittings are tight.
11. Checked that all hose and cables have been routed so they will not be damaged by moving parts or foreign objects.


WARNING
Prior to starting the vehicle, verify all people and equipment are clear from around the vehicle and the AutoSteer system is powered down. The vehicle could turn unexpectedly and cause injury or death to bystanders.

Note: Before powering up the AutoSteer system, move the vehicle to a flat, wide open area where if the vehicle does begin to spin, it will not damage anything.

SA Module Installation

The **SA Module Installation** chapter contains information in the following sections:

- *SA Module Mounting Orientation*
- *Mount the SA Module*

SA Module Mounting Orientation

The SA Module can also only be mounted in certain orientations. *Figure 3-1* shows the correct mounting positions and *Figure 3-2* shows the improper mounting positions.

Figure 3-1 Correct SA Module Mounting Orientations

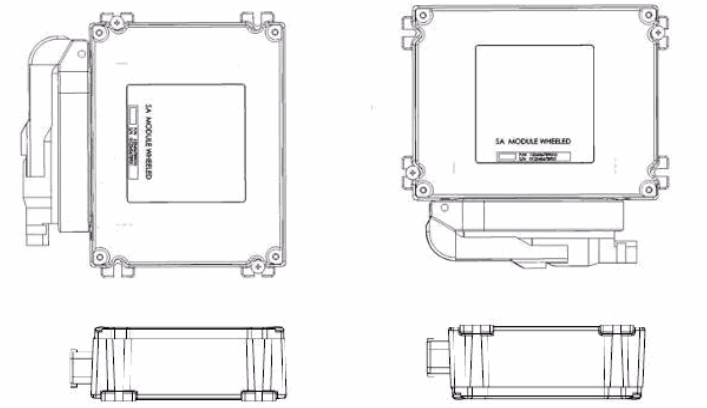
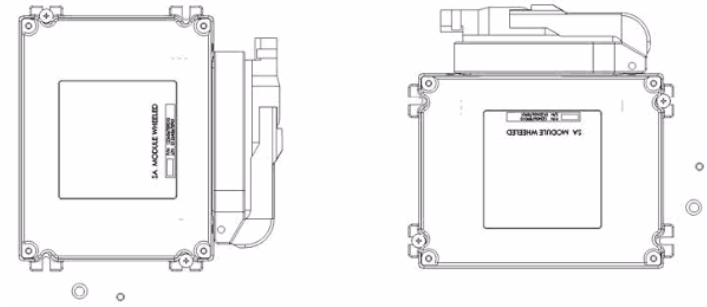


Figure 3-2 Incorrect SA Module Mounting Orientations



Mount the SA Module

Due to the variety of options available on vehicles and the possible configuration differences, it may be necessary to install the SA Module in a location other than the example shown here. If an alternative location is required, choose a location where the SA Module can be protected from damage from moving parts or crop debris and excessive moisture from weather and cleaning equipment.

1. Locate the mounting bracket on the left, rear side of the vehicle. See *Figure 3-3*.

Figure 3-3 SA Module Mounting Location

2. Start two of the SA Module mounting screws into the mounting bracket on the opposite side of the L-bracket.
3. Attach the SA Module bracket to the vehicle frame with a 3/8" x 1-1/2" bolt, flat washers, and nut from the installation kit. See *Figure 3-4*. Tighten the bracket with a 9/16" wrench and 9/16"socket and ratchet.

Figure 3-4 SA Module Bracket Installed

4. Attach the SA Module to the bracket with the connector facing the rear with the two other screws provided in the installation kit. Tighten the screws with a #2 Philips screwdriver. See *Figure 3-5*.

Figure 3-5 SA Module Attached to the Bracket

Roof Module Installation

The **Roof Module Installation** chapter contains information in the following sections:

- *Safety Notes*
- *Roof Rail Installation Procedure*

Safety Notes

- The AutoSteer system must be powered OFF when installing or removing the Roof Module.
- The Roof Module must always be firmly secured to the Roof Rail using the hardware provided whenever the vehicle is in operation to prevent the Roof Module from releasing from its bracket and falling.
- The Roof Module must be removed when transporting the vehicle at speeds above 30 mph (48 km/h).
- Ensure you are in a stable position on the vehicle platform when removing the Roof Module so that you do not fall or drop the Roof Module.
- Use a ladder to install the AutoSteer Roof Rail.

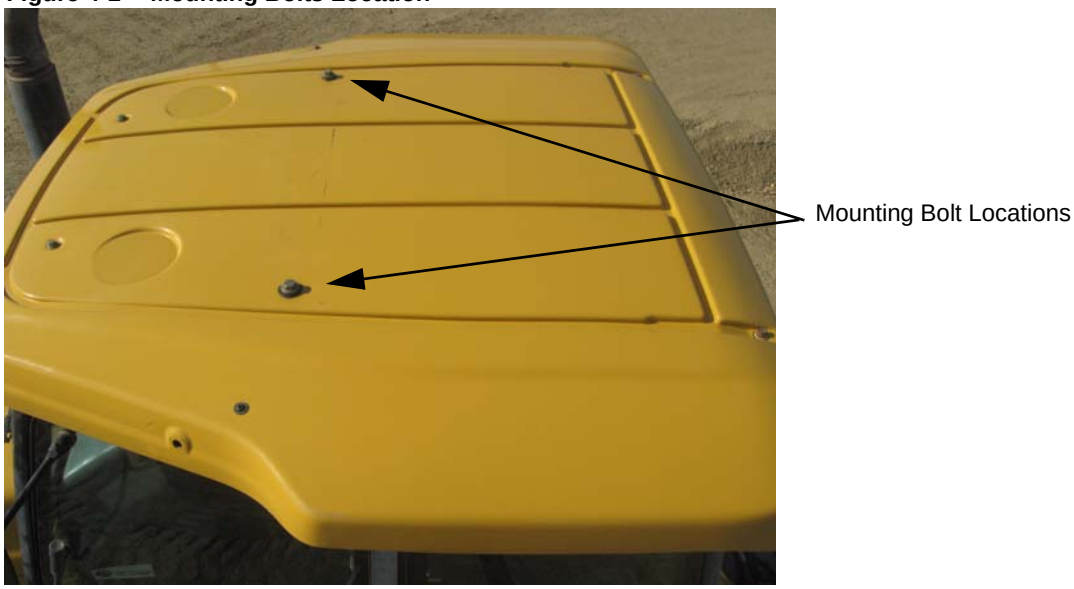
WARNING
Ensure that you are in a stable position on the vehicle platform when installing or removing the Roof Rail and Roof Module, so that you do not fall.

Roof Rail Installation Procedure

1. Place the ladder as close as possible to the side of the cab.
2. Locate the two bolts on top of the cab shown in *Figure 4-1*. Remove the bolts with a 21mm socket and ratchet.

Note: Leave the rubber gasket on top of the roof.

Figure 4-1 Mounting Bolts Location



3. Place two M16 flat washers on both rubber gaskets. See *Figure 4-2*.

Figure 4-2 Place Flat Washers on Rubber Gasket

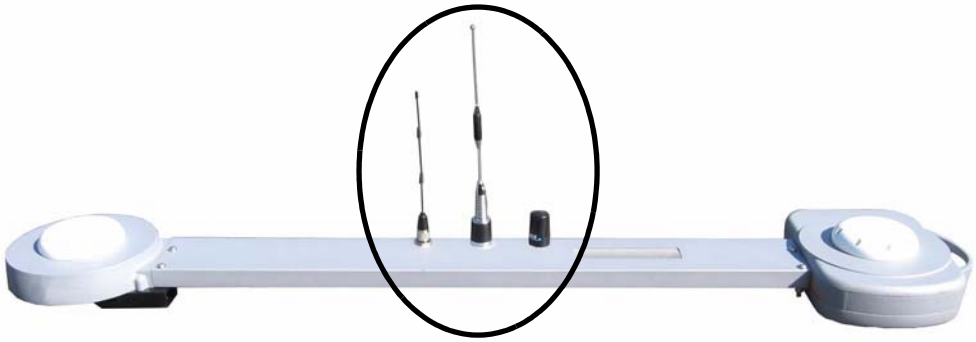
4. Place the Roof Rail on top of the washers and center it over the cab.
5. Attach the Roof Rail using the bolts removed earlier and tighten it securely with a 21mm socket and ratchet. See *Figure 4-3*.

Figure 4-3 Attach Quick Attach Rail

6. Attach the three antennas to the proper antennas connections on the Roof Module. See *Figure 4-4*.

Note: Hand tighten the connections. Do not over tighten.

Figure 4-4 Attach the Antennas



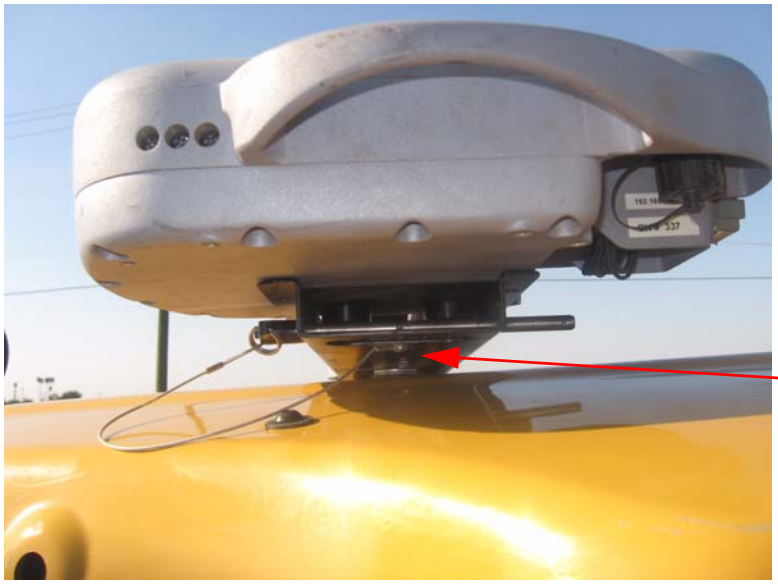
7. Place the Roof Module on the Roof Rail.
8. Remove the locking pin from the Roof Rail. See *Figure 4-5*.

Note: Press the button on the end of the handle to allow the pin to be removed.

Figure 4-5 Removing the Locking Pin

9. Adjust the Roof Module position on the rail.
10. Re-insert the locking pin to lock the Roof Module onto the vehicle. See *Figure 4-6*.

Figure 4-6 Locking Pin Inserted



11. The Roof Module is now installed. See *Figure 4-6*.

Figure 4-7 Roof Module Installed

Display Installation

The **Display Installation** chapter contains information in the following sections:

- *Introduction*
- *Installation Procedure*

Introduction

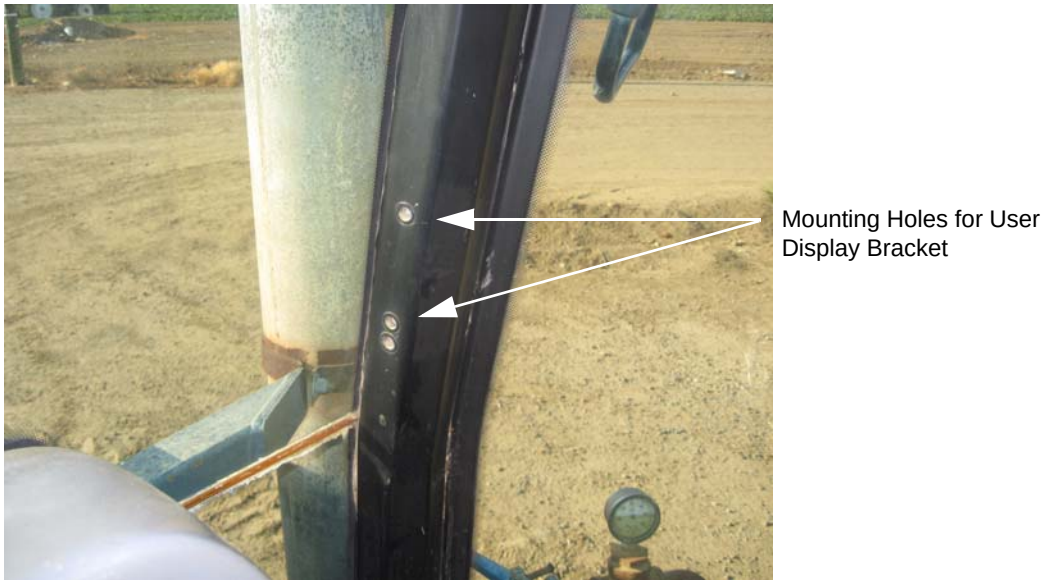
This chapter provides the instructions for installing the RAM mount ball in the cab so that the user display can be attached later. Refer to your display's User Manual for instructions on installing the display.

Note: If the holes shown for mounting the display are being used by another piece of equipment, other mounting locations can be used. However, for best performance and ease of use, use the holes shown in the installation manual.

Installation Procedure

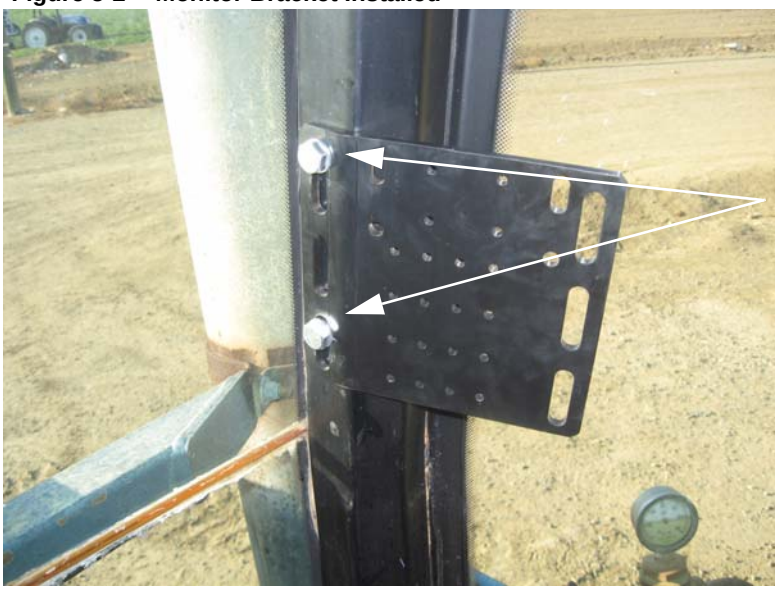
1. Locate the accessory mounting bracket holes on the front right corner cab post. If necessary, remove any protective screws or covers from the cab post. See *Figure 5-1*.

Figure 5-1 Identify the Bracket Mounting Holes



2. Attach the user display bracket to the mounting holes with the two longer M10 x 35mm bolts and washers that are included with the installation kit. See *Figure 5-2*. Tighten the bracket with a 17mm socket and ratchet. The bracket should angle back towards the side window.

Figure 5-2 Monitor Bracket Installed



3. Attach the RAM mount ball to mounting bracket using the four 10-32x3/4 Phillips screws and lock nuts provided. Tighten using a 3/8" wrench and #2 Philips screwdriver.

Figure 5-3 Mounted Display Bracket

Note: Refer to the user display manual for the remaining user display specific installation instructions.

4. Replace the side panel between the tracks and the cab on the vehicle that was removed at the beginning of the installation.

Connecting System Cables

The **Connecting System Cables** chapter provides information in the following sections:

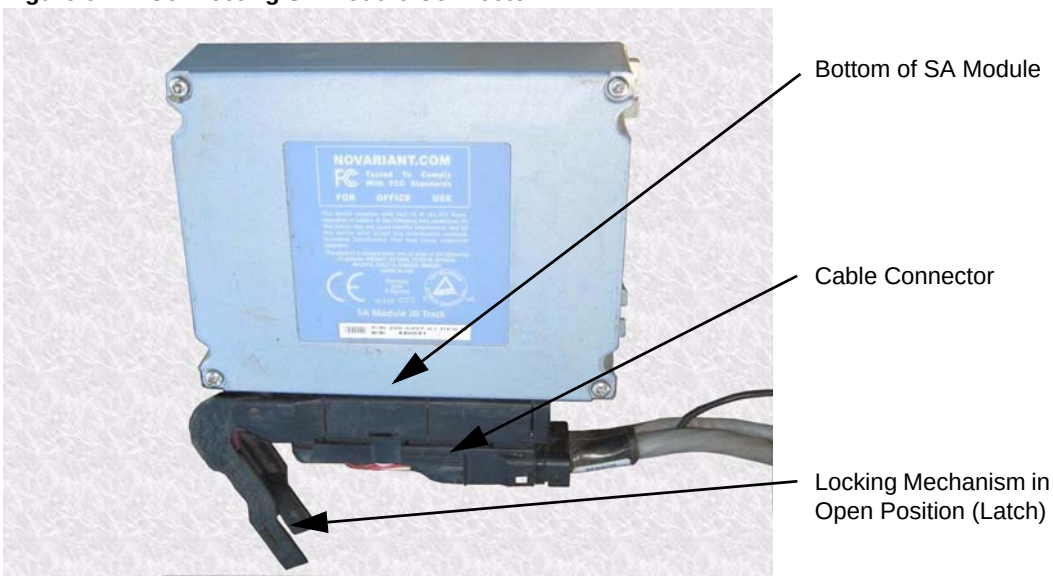
- *SA Module Harness*
  - *SA Module Connection*
  - *Steering Valve Connections*
- *Main Cable Harness*
  - *Roof Module*
  - *SA Module Harness*
  - *Main Cable Harness Connections Inside Cab*
- *Power Supply Connection*
  - *Cab Power Connection*
  - *Battery Power Connection*

SA Module Harness

SA Module Connection

1. Connect the SA Module harness to the SA Module. See *Figure 6-1*. *Figure 6-1* shows an example SA Module not attached to a vehicle and is to be used as a reference on how the SA Module harness connector attaches to the SA Module.

Figure 6-1 Connecting SA Module Connector



2. Close the cable connector locking mechanism as shown in *Figure 6-2*.

Figure 6-2 SA Module Connector (closed)

Steering Valve Connections

1. Route SA Module harness's 4-pin and 10 pin cable to the Steering Valve along the rear of the vehicle and then along the right side with the newly installed hose connections.
2. Connect the 4-pin and 10-pin connectors to the Steering Valve jumper cable. See *Figure 6-3*.

Figure 6-3 Hydraulic Valve Connections

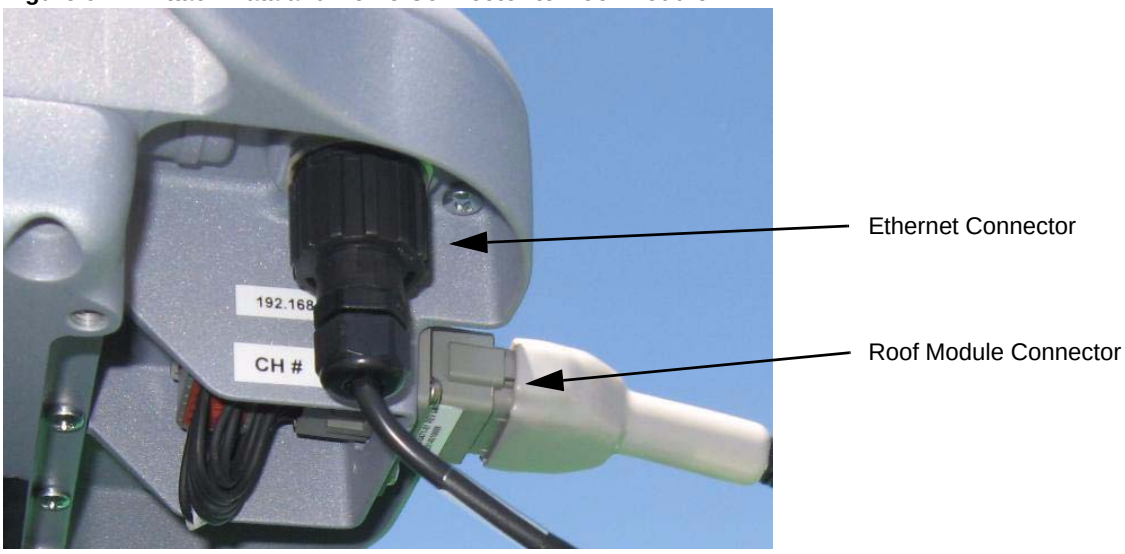
3. Neatly coil any excess cable and secure with cable ties.
4. Replace the side panel between the tracks and the cab on the vehicle that was removed at the beginning of the installation.

Main Cable Harness

Roof Module

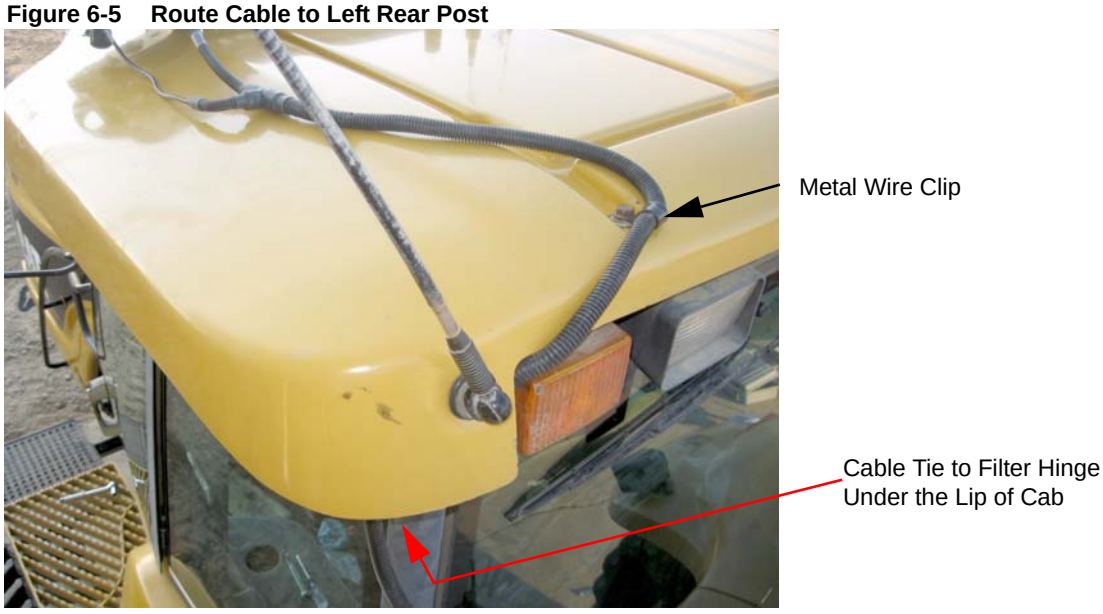
1. Attach the Main Cable Harness's Roof Module connector and Ethernet connector to the Roof Module. See *Figure 6-4*.

Figure 6-4 Attach Data and RJ-45 Connector to Roof Module



2. Route the Roof Module data cable to the back of the cab. Secure the cable to the roof with a metal wire clamp and to the underside of the roof with a cable tie. See *Figure 6-5*. Loosen the bolt on the roof with a 15mm socket and ratchet.

Figure 6-5 Route Cable to Left Rear Post



3. Route the cable down the left side cab post. There is nothing to attach the cable to the cab post on the bottom. To hold the harness, a cable tie must be looped through the space between the fender and the cab and wrapped around the square tubing below the fender.
4. Open the rear window and remove the wire access rubber grommet. See *Figure 6-6*.

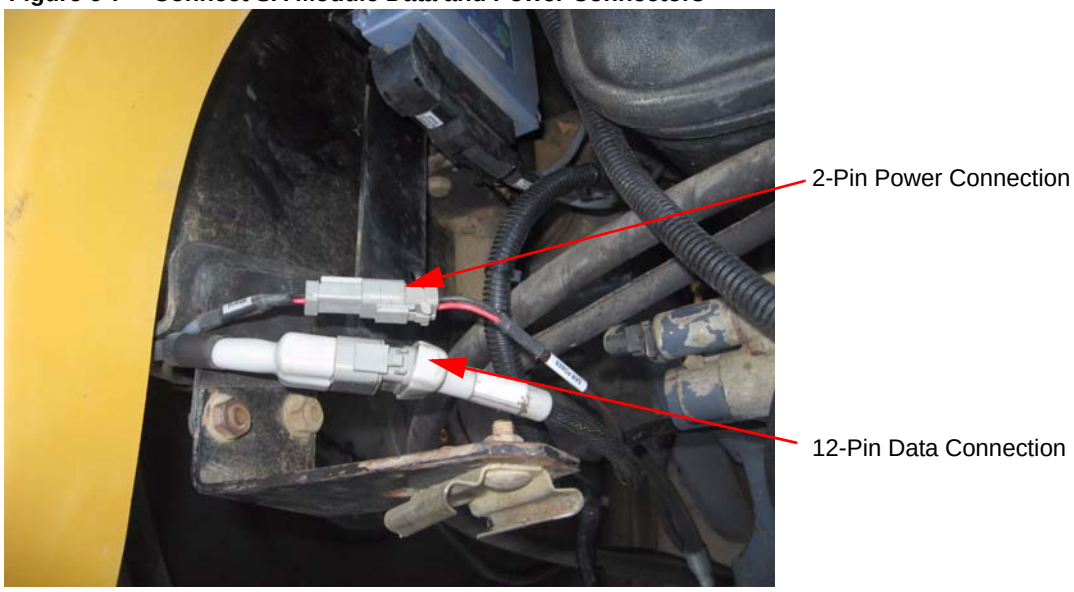
Figure 6-6 Remove Rubber Grommet

5. Route the Main Cable Harness into the cab through the wire access port.

SA Module Harness Connections

1. Route the Main Cable Harness's SA Module data and SA Module power cables out the back window where the Roof Module harness was routed in.
2. Connect the 12-pin data and 2-pin power connectors between the Main Cable Harness and the SA Module harness near the SA Module. See *Figure 6-7*.

Figure 6-7 Connect SA Module Data and Power Connectors



3. If necessary cut a slot in the rubber grommet and then replace the rubber grommet and close the rear window.
4. Secure the Main Cable Harness cables to the rear of the vehicle. See *Figure 6-8*.

Figure 6-8 Route Cables on Back of Vehicle

5. Neatly coil excess cables and secure with cable ties. See *Figure 6-9*.

Figure 6-9 Coil and Secure Excess Cables

Main Cable Harness Connections Inside Cab

Figure 6-10 shows the Main Cable Harness connections used inside the cab. *Table 6-1* shows the functions of the Main Cable Harness cab connectors. Refer to your display's User Manual for instructions on connecting the main cable harness connections shown to the correct ports and harnesses on the user display and display cables.

Figure 6-10 Main Cable Harness Cab Connections

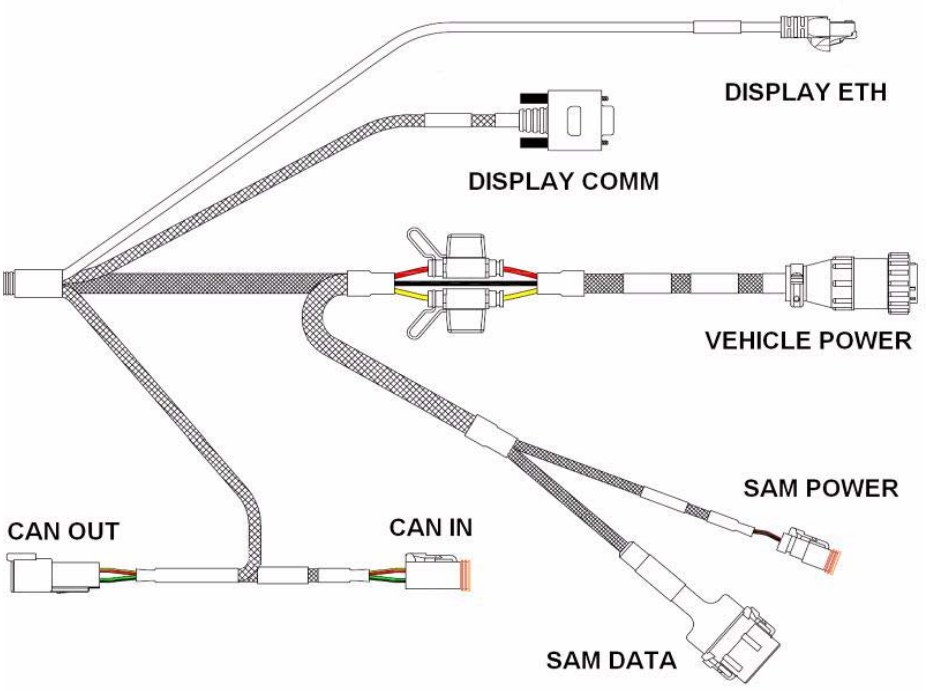


Table 6-1 Cab Main Cable Harness Connector Functions

Main Cable Harness Connector	Connector Function
DISPLAY ETH	Display Ethernet Port (RJ-45)
DISPLAY COMM	Display Communication Port (DB-9)
VEHICLE POWER	12 Volt Power Supplied by Display Harness
SAM POWER	Connected to SA Module Harness Power Connector
SAM DATA	Connected to SA Module Harness Data Connector
CAN IN	Not Used for this Installation
CAN OUT	Not Used for this Installation

Power Supply Connection

The following sub-sections describe basic instructions for connecting the AutoSteer system to available vehicle power sources:

- *Cab Power Connection*
- *Battery Power Connection*

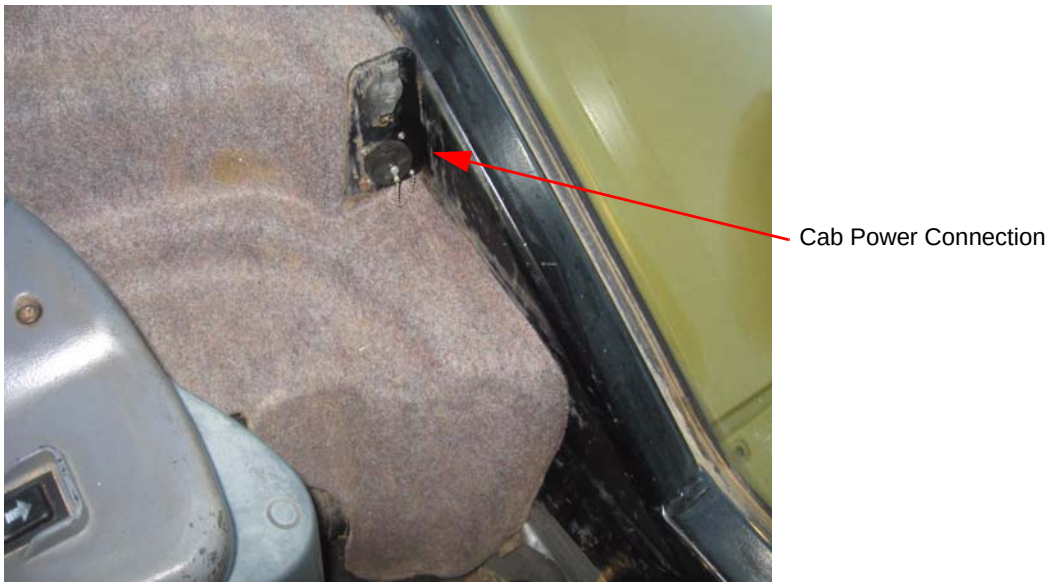
Note: Refer to your display user manual before connecting the AutoSteer system to vehicle power.

The AutoSteer Main Cable Harness must be connected to a 3-pin 12V power source. Your display user manual provides specific instructions for connecting power to the AutoSteer system and specifies the appropriate vehicle power source.

Cab Power Connection

1. Locate the cab console right-side 12V power outlet. See *Figure 6-11*.
2. Use this 12V accessory power connector if the display manual specifies connecting to power inside the cab.

Figure 6-11 Cab 12V Power Outlet



Battery Power Connection

1. Locate the vehicle battery. See *Figure 6-12*.
2. Connect to the vehicle battery if the display manual specifies a direct battery connection.

Figure 6-12 Vehicle Battery Location

Note: A battery cable is provided with the AutoSteer system when a direct battery connection is required.

Post-Installation Procedures and Information

The **Post-Installation Procedures and Information** chapter provides information in the following sections:

- *Create New Vehicle*
- *Hydraulic Leak Test*
- *Calibration and Tuning Notes*

Once the entire AutoSteer system, including the user display and display harnesses, have been installed on the vehicle, the procedures and notes provided in this chapter must be followed to complete the installation and prepare the vehicle for full AutoSteer capabilities.

Create New Vehicle

Once the entire system has been installed, the operator must first create a new vehicle profile. This configures the system so that the user display can properly communicate with the various sensors and components on the vehicle. Follow the procedure below to create a new vehicle.

1. Ensure that the vehicle is still in Park and/or the park brake is set to prevent the vehicle from moving.
2. Ensure the vehicle is off. Do not start the vehicle yet.
3. Power up the AutoSteer system.
4. Follow the instructions provided in the user display's user manual to create a new vehicle.

Note: Do not start the vehicle until after the Hydraulic Leak Test has been performed on the vehicle. After the vehicle has been created, shut down the AutoSteer system prior to starting the vehicle.

Hydraulic Leak Check

On completion of installing the entire AutoSteer system including the Roof Module and user display, the system needs to be checked for leaks. Follow the procedure below to check for leaks.

1. Clear any bystanders away from the vehicle. If there is a hydraulic leak, they could be injured.
2. Put the vehicle into Park and/or set the park brake to prevent the vehicle from moving.
3. Turn the vehicle over for a few seconds and if the vehicle starts, immediately shut it down.
4. Walk around the vehicle and check all the hydraulic fittings that were opened. Look for any oil leaks.
5. Once all leaks have been repaired, or if none are found, start the vehicle again and let it run at a low idle.

Note: If an oil leak is noticed during any part of this test, immediately shut down the vehicle and repair the leak.

Note: The entire vehicle will rotate on the tracks when the steering wheel is turned. Make sure the vehicle will not strike anything or anyone before continuing. If necessary, move the vehicle to an open area.

6. Take the vehicle out of Park and/or remove the park brake. Turn the steering wheel manually to the right and left stops two or three times to get any air out of the hoses.
7. Confirm that the vehicle rotates in the correct direction and that the vehicle steers the same as it did before the system was installed.
8. Put the vehicle back into Park and/or reset the park brake. Shut down the vehicle, walk around it again, and check for any hydraulic leaks.
9. Once the leaks have been repaired, or if none are found, start the vehicle again and let it run at a low idle.
10. Take the vehicle out of Park and/or remove the park brake. Move the vehicle to an open, flat area and leave the vehicle in park.
11. Power up the AutoSteer display.
12. Power up the User display and navigate to the **Hydraulic Valve** window from the **Steering Components** window.
13. Command the vehicle to turn Right and then Left a few times. The vehicle should rotate in the direction it is commanded. If the vehicle rotates in the wrong direction, the hoses were attached to the wrong ports on the valve and need to be switched.
14. Power down the AutoSteer display, put the vehicle back into Park and/or reset the park brake, and shutdown the vehicle.
15. Once again check the vehicle for hydraulic leaks and repair any that are found.

Final Hardware Installation Checklist

This **Final Hardware Installation Checklist** contains the verifications steps necessary after the installation of the AutoSteer system.

Note: The Final Hardware Installation Checklist is on the back of this page. Fill in the checklist after the installation is complete. You should keep a copy of this checklist for future reference when servicing the AutoSteer system.

Customer Name:_____

Location/Address: _____

Contact Information _____

Machine Model: _____ Year: _____ Serial #: _____

AutoSteer Installation Kit Part Number: _____

NOTES

_____

_____

_____

_____

_____

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_____

_____

_____

_____

_____

_____

Name of Installer: _____ Date Installed:_____

Final Hardware Installation Checklist

1. User Display Bracket Installed and all fasteners are tight. ☐
2. User Display Installed. ☐
3. Roof Rail is installed and all fasteners are tight. ☐
4. SA Module is installed and all fasteners are tight. ☐
5. All cable ends are connected. ☐
6. All cables are secured with cable ties. ☐

Hydraulic Installation Checklist

1. Steering Valve is installed and all fasteners are tight. ☐
2. All hose fittings are tight. ☐
3. All hoses are routed and secured with cable ties. ☐
4. Vehicle has been checked for hydraulic leaks after the installation. ☐
5. Manual steering is normal after the AutoSteer installation. ☐

AutoSteer Performance Checklist

1. Complete AutoSteer system calibration. ☐
2. Complete AutoSteer system tuning. ☐
3. Line acquisition performance is good. ☐
4. On-line steering performance is good. ☐
5. Manual override (kick-out) is working. ☐
6. Temperature sensor is working. ☐
7. Record Temperature Sensor reading after idling engine for 10 minutes: ☐ Temp._____
8. Check that Manual Steering speed is the same as before the installation. ☐